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NAVAL POSTGRADUATE SCHOOL

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THESIS

ANALYSIS OF SUICIDE BEHAVIORS IN THE NAVY ACTIVE DUTY AND RESERVE COMPONENT POPULATION

by

Neeta Serena Blankenship
Kristin M. Shepherd

March 2015

Thesis Advisor:	Yu-Chu Shen
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We analyze the role of service-specific and mental health risk factors in active duty and reserve component Navy enlisted and officer suicide attempts and deaths from 2002 to 2011. We estimate the effect of non-demographic, service-specific, pre-screening, and mental health factors through logit regression to determine their association with the occurrence of suicide attempts and death by suicide. We further evaluate how these risk factors differ between the active duty and reserve components. Results consistently found that diagnosed mental health conditions, specifically, depression and substance use, increased the odds of Sailors in all populations attempting and/or dying by suicide. Service-specific factors showed varying levels of significance across the different populations; however, those who were demoted and entry-level paygrades (E1-E4) in the enlisted population were at higher risk for suicide attempt and death. Deployment to a combat zone was associated with lower odds of attempting and dying by suicide for all populations except enlisted reservists. There were few significant covariates of suicide attempts or death among the officer population. The identification of common risk factors will aid in identifying service-wide efforts to determine the highest risk populations and develop tailored prevention programs.

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ANALYSIS OF SUICIDE BEHAVIORS IN THE NAVY ACTIVE DUTY AND RESERVE COMPONENT POPULATION

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ABSTRACT

We analyze the role of service-specific and mental health risk factors in active duty and reserve component Navy enlisted and officer suicide attempts and deaths from 2002 to 2011. We estimate the effect of non-demographic, service-specific, pre-screening, and mental health factors through logit regression to determine their association with the occurrence of suicide attempts and death by suicide. We further evaluate how these risk factors differ between the active duty and reserve components. Results consistently found that diagnosed mental health conditions, specifically, depression and substance use, increased the odds of Sailors in all populations attempting and/or dying by suicide. Service-specific factors showed varying levels of significance across the different populations; however, those who were demoted and entry-level paygrades (E1-E4) in the enlisted population were at higher risk for suicide attempt and death. Deployment to a combat zone was associated with lower odds of attempting and dying by suicide for all populations except enlisted reservists. There were few significant covariates of suicide attempts or death among the officer population. The identification of common risk factors will aid in identifying service-wide efforts to determine the highest risk populations and develop tailored prevention programs.

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	Active Duty Component
AFHSC	Armed Forces Health Surveillance Center
AFMES	Armed Forces Medical Examiner System
AFQT	Armed Forces Qualification Test
CAPER	Comprehensive Ambulatory/Professional Encounter Record
CY	calendar year
DEERS	Defense Enrollment Eligibility Reporting System
DMDC	Defense Manpower Data Center
DOD	Department of Defense
DODSER	Department of Defense Suicide Event Report
DOD TF	Department of Defense Task Force on the Prevention of Suicide by Members of the Armed Forces
DONSIR	Department of the Navy Suicide Incident Report
EDIPIN	Electronic Data Interchange Personal Identifier Number
FY	fiscal year
ICD-9	International Classification of Diseases, 9th Revision
NDI	National Death Index
PTSD	Post-Traumatic Stress Disorder
RC	Reserve Component
SADR	Standard Ambulatory Data Record
SIDR	Standard Inpatient Data Record
SECDEF	Secretary of Defense
TEDI	Tricare Encounter Data-Institutional
TEDN	Tricare Encounter Data-Non-Institutional

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I. INTRODUCTION

Navy suicide behavior has increased at an alarming rate over the last decade. The Department of Navy Suicide Incident Report calculated "the average yearly suicide rate (suicides per 100,000 personnel) from 1999–2002 was 10.7 for the USN" (Stander, 2004, p. 2). Active duty suicide deaths continued to rise and peaked in CY2012 with 59 deaths, resulting in a suicide rate of 17.8 per 100,000, greatly exceeding the civilian (unadjusted) rate of 12.5 (Task Force Resilient, 2013, p. 26).[1] Additionally, CY2014 marks the highest occurrence of Navy selected reserve fatalities from suicide acts, recorded at 15 deaths as of 05 November 2014 (Navy Personnel Command, 2014). This trend has gained significant attention from the Secretary of Defense (SECDEF) and the Navy leadership.

One way to gain deeper understanding of the suicide behavior is to analyze the different stages—suicidal thoughts, suicide attempts, and suicide completion. Each stage is potentially associated with different risk factors that can vary among individuals. Identifying these risk factors is necessary to minimize and possibly prevent suicide behavior. The impact of these unfortunate actions is not limited to the individual committing the act; loved ones, peers, and local communities bear an emotional and physical toll. From a manpower planning perspective, the loss of a valuable professional affects the individual's command readiness, as well as the Navy's overall ability to execute the mission effectively. The retrospective analysis that ensues from fatal and non-fatal suicide acts is a time-consuming effort that detracts from mission focus and readiness. Manning gaps present a significant challenge on an already constrained budget by seeking to alter accession numbers, training efforts, and redistribution of manpower (Ramchand et al., 2011). The identification of risk factors common to active duty and selected reserve component sailors who attempt suicide and/or die by suicide will provide a framework for current Navy suicide prevention and intervention programs. This framework will aid in identifying service-wide efforts to determine the highest risk populations and develop tailored prevention programs.

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[1] Civilian unadjusted rate reflects the suicide rate of the actual civilian population. It is not reflective of comparable military demographics. Reserve component (RC) service members refer to those individuals enlisted or commissioned in the selected reserve and National Guard not in Title 10 status (annual training, weekend inactive duty training).

A. BACKGROUND

Suicide attempts and suicide completions are relatively rare events in the U.S. Navy. Suicide attempts or self-intentional harm were not well documented in the military prior to 2009 (Hilton et al., 2009, p. 6). A suicide problem was identified from 1991 to 1998 when the average rate of death by suicide increased to 12.2 per 100,000 persons, at which point the Navy initiated a suicide prevention program (Chavez, 2009). The average Navy suicide rate was relatively stable at 10.7 deaths per 100,000 persons between 1998 and 2008 (Chavez, 2009).

Since that time, Navy suicide deaths have been on the rise and reached an all-time high of 17.8 deaths per 100,000 persons in CY 2012. As of 05 November 2014, 61 U.S. Navy sailors have died by suicide in CY 2014, including 46 active duty members and 15 selected reservists (Navy Personnel Command, 2014). These statistics call into question if current Navy suicide prevention efforts are enough and dictate the need for extensive analysis of all risk factors present at different stages of suicide for both the active duty and selected reserve component of the Navy.

The Department of Defense Suicide Event Report (DoDSER), in an effort to standardize and compile data across the DOD, collects information related to suicide related behaviors, including suicide attempts, and includes a data registry standardized for all four major branches of military service. Findings from year to year consistently reveal demographic specific risk factors. For example, white males from the ages of 19 to 24 years old have a higher occurrence of suicide-related behaviors for both the civilian and DOD populations (Ramchand et al., 2011). In this thesis, we analyze the role of demographic, service-specific, and prescreening factors that are associated with the occurrence of suicide attempts and death by suicide. We address the following questions:

1. What non-demographic, service-specific factors (for example, sailor rating, warfare platform, combat zone deployment, type of command, transition status), and pre-screening factors (such as AFQT, substance

abuse, medical or legal waivers) are associated with the occurrence of suicide attempts and death by suicide?

2. How have suicide behavior trends (suicide attempts and death) differed between the active duty and reserve component Navy officer and enlisted populations?
3. In both the active duty and the reserve components, how do risk factors change between suicide attempts and death by suicide?

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II. BACKGROUND ON SUICIDE RESEARCH

A. DEFINITION OF SUICIDE DEATHS AND SUICIDE ATTEMPTS

The World Health Organization (WHO) estimates that "every 40 seconds a person dies by suicide somewhere in the world, and many more attempt suicide" (World Health Organization, 2014, p. 2). All demographics, countries, and cultures are affected by acts of suicide (Task Force on the Prevention of Suicide by Members of the Armed Forces, 2010, p. 7). There are many definitions of suicide and suicide attempts. The lack of consistency, standardization, and monitoring of suicide and suicidal behaviors creates variability when making comparisons across time and between different populations. For the purpose of this study, the following definitions from the Center for Disease Control (2013) will be used:

- Suicide: death caused by self-directed injurious behavior with any intent to die as a result of the behavior. For this analysis, suicide deaths are identified using the NDI.
- Suicide Attempt: a non-fatal self-directed potentially injurious behavior with any intent to die as a result of the behavior. A suicide attempt may or may not result in injury. However, for this analysis, suicide attempts are identified through ICD-9 codes embedded in clinical data, which will capture self-directed injurious behavior that resulted in injury.

Death by suicide is a rare and unpredictable event. Suicide risk factors have differing levels of influence for each individual and play varying roles in the decision of an individual to take their life. Although this thesis analyzes two suicidal behaviors, it must be understood that every individual that experiences suicide ideations and/or makes a suicide attempt will not necessarily die. However, those that have suicide ideations and make suicide attempts are at an increased risk. RAND identifies that while "the majority of suicide deaths occur on individuals' first attempts and the majority of those who make nonfatal attempts do not go on to die by suicide, a prior suicide attempt is the strongest predictor of subsequent death by suicide" (Ramchand et al., 2011, p. xvi).

B. CIVILIAN AND MILITARY POPULATION DIFFERENCES

Service members, regardless of status, have committed to sacrificing their lives to defend the United States Constitution and the nation. The stressors experienced by service members and their families are not present within the majority of the civilian population (Moore & Barnett, 2013 p. 24). Inability to manage stress appropriately can subsequently impact an individual's interpersonal relationships and affect psychological health. Additionally, the military population has a different demographic composition than that of the civilian population, which increases the difficulty in comparing the two groups and having a true depiction of the suicide trends. Primarily, the military population is younger, disproportionately male, and has a different distribution of racial and ethnic groups than that of the civilian population (Ramchand et al., 2011). It is important to note that DOD suicide research has primarily focused on the active duty population and that the Selected Reserve and National Guard adds additional population variability.

Researchers have used adjusted values to simulate a civilian population that is comparable to that of the military. RAND's report, *The War Within: Preventing Suicide in the U.S. Military*, generated a synthetic national population with a demographic make-up similar to the military and found that from 2001 to 2006 the synthetic national population maintained a consistent suicide rate, while the DOD suicide rate increased (Ramchand et al., 2011, p. xv). The military suicide rate has traditionally been below that of the national rate. The concern is that the gap between the two populations is closing. It is known that the military suicide rate has continued to rise since 2006, so it can be estimated that the gap is substantially smaller at this point in time. Additionally, in 2008 the active duty suicide rate surpassed that of an adjusted civilian for the first time.

C. SUICIDE AND SUICIDE ATTEMPTS RISK FACTORS

Suicide and suicide attempts are dynamic events that occur in response to the interaction of multiple social, psychological, and individual factors. It is generally accepted that there is not a single cause of suicide, but rather an excess of risk factors that in combination result in an increased risk for suicidal behavior (Task Force on the Prevention of Suicide by Members of the Armed Forces, 2010, p. ES-3). Additionally, the presence of protective factors can potentially reduce and nullify the increased risk. The Suicide Prevention Resource Center (SPRC) describes risk factors as "characteristics that make it more likely that individuals will consider, attempt, or die by suicide" and protective factors as "characteristics that make it less likely that individuals will consider, attempt, or die by suicide" (Suicide Prevention Resource Center, 2011). Specific demographic characteristics, a prior suicide attempt, substance abuse, a mental health diagnosis, and access to lethal means have been identified as common risk factors across the general population to include the DOD and DON (Suicide Prevention Resource Center, 2011; Ramchand et al., 2011, pp. 7–27). A detailed summary follows of the relationship between these risk factors and suicidal behaviors in more details below.

1. Demographics

Consistent with prevailing literature, male suicide rates exceed that of females across civilians and the DOD, regardless of status (Ramchand et al., 2011; Lien et al., 2013b; CDC, 2012). The military population is disproportionately men; however, even when adjusting for this variance, suicide rates are substantially higher among men. Prior to 2005, suicide was more prevalent among those younger than 25 years of age for all populations. National, DOD and Navy suicide rates have since shifted. It is reported that suicide is now more common among 25- to 34-year olds. Specifically, the suicide rate for 25- to 34-year olds, during 2007–2012, was 15.3 per 100,000 (Centers for Disease Control and Prevention, 2012; Lien et al., 2013b). Additionally, the Center for Disease Control states "the prevalence of suicidal thoughts, suicide planning, and suicide attempts is significantly higher among young adults aged 18–29 years than among adults aged ≥30 years" (Centers for Disease Control and Prevention, 2012, p. 2). Utilizing personnel data files from Navy and Marine Corps active duty personnel, Center for Naval Analyses (CNA) reported suicide rates were highest for non-Hispanic whites at 13.1 per 100,000 from 2001–2012 (Lien et al., 2013b). These findings are consistent across the different branches of Armed Forces and national suicide civilian estimates.

2. Substance Use

Statistics for civilian and military populations commonly report substance use as a predictor of all behaviors associated with the evolution of suicide (Jakupcak et al., 2009, p. 306). In fact, the 2012 DODSER reports that alcohol use and drug use were involved in 33.6% and 24.5% of DOD suicides, respectively. In the Navy specifically, approximately 40.7% and 15.3% of suicides included the involvement of alcohol and drugs, respectively. Additionally, alcohol use was involved in over 50% of USN AD and RC (in active duty status) suicide attempts between 2010 and 2012 (Smolenski, 2013).

3. Mental Health

Mental health disorders are commonly found to be significant factors in suicide risk across all populations; specific to the DOD, a diagnosis of anxiety, major depression, or posttraumatic stress disorder (PTSD) are most prevalent. In 2012, 52% of AD DOD reported suicide attempts and 42.1% of AD DOD suicide decedents were diagnosed with a behavioral health condition. Studies have shown that it is difficult to separate the physical condition of TBI from psychiatric diagnoses such as depression and PTSD (Moore & Barnett, 2013, p. 146); however, the *Journal of the American Medical Association* reports that TBI "has been found to be associated with significantly increased risk for suicidal ideation, suicide attempts, and death by suicide, especially when occurring together with psychiatric and/or substance abuse problems" (Bryan & Clemans, 2013, p. 687). The inherent risks associated with military occupations likely put members at an increased risk of behavioral health issues and, by association, suicide.

4. Hardships and Life Stressors

Negative life events can greatly impact individual stress and precipitate behaviors associated with suicide across all populations (Ramchand, 2011, p. 34). The U.S.

Department of Defense Task Force on the Prevention of Suicide by Members of the Armed Forces (2010) defines work stress as job loss, co-worker issues, poor work performance, and/or work-related hazing. These stressors are often derived from larger issues or events to include relationship loss, legal concerns, disciplinary problems, and demotions. In *The Military Psychologists' Desk Reference*, Rudd found, "84% of suicide attempts were related to work stress and 60% precipitated by a failed relationship" (Moore & Barnett, 2013, p. 144). Among 2012 DOD suicide and suicide attempts, over 40% of suicide decedents experienced family and relationship stressors within 90 days of the event (Smolenski, 2013).

Civilians and Reserve Component service members have been more susceptible to financial stressors associated with higher unemployment rates and the recent economic recession. AD personnel are typically insulated from these particular economic issues, while RC must maintain civilian professions and balance military obligations. "National data for the general population have demonstrated a clear link between the economic downturn and the rise in suicides between 2005 and 2010 (moving from under 11.0/100,000 to 12.0/100,000)" (Moore & Barnett, 2013, p. 145).

5. Access to Fire Arms

Firearms have consistently been the primary method of suicide and the most lethal means of death for both the civilian and military populations. Non-military firearms were used in more than 40% of all DOD reported suicides in 2008–2012. During this same time period, military firearms caused less than 25% of all DOD suicides (Smolenski, 2013). This contradicts the belief that military firearms put service members at an increased risk of suicide, however military members are more likely to own a personal firearm.

6. Prior Suicide Attempts

Attempting suicide places individuals at a higher risk of completing suicide. For example, Harris & Barraclough found that "those who had attempted suicide were at 38-times greater risk for dying by suicide than those who had not attempted suicide" (Suicide Prevention Resource Center, 2011, p. 3). According to the Navy and Marine

Corps “Suicide At A Glance” flyer and Van Orden et al., the ratio of suicide attempts to suicide completions range from 25–30 to 1 (Navy and Marine Corps Public Health Center, n.d.; Van Orden et al., 2010).

D. DOD SPECIFIC SUICIDE AND SUICIDE ATTEMPT RISK FACTORS

Over the last two decades the U.S. government, Department of Defense (DOD), and Department of the Navy have increased the attention placed on suicide prevention leading to much research that identified consistent suicide risk and protective factors. The military has been leading suicide prevention efforts with the development of programs and initiatives focused on education, identification and reduction of risk factors, and strengthening protective factors (Task Force on the Prevention of Suicide by Members of the Armed Forces, 2010, p. 70). The majority of suicide risk factors are similar between the military and civilian populations. However, the military culture and additional physical and mental stress unique to the military environment such as deployments, combat exposure, and family separation appears to intensify the presence of risk factors, specifically mental health conditions (Moore & Barnett, 2013, p. 143–145).

1. Enlisted

Enlisted personnel make up the majority of the active duty and selected reserve forces. Thus, it is not surprising that across the DOD and the DON, enlisted personnel have a higher incidence of suicide than officers (Lien, 2013a, pp. 14–16). It is difficult to make accurate comparisons between the enlisted and officer suicide rate as the officer suicide sample is extremely small. Additionally, within the enlisted ranks occurrence of suicide differs between pay grades (Lien, 2013a, p. 15). Historically, the rate of suicide for E1-E4 service members is higher than that of E5-E9’s. However, the gap between the two subsets is closing (Smolenski, 2013, p. 54). There is an absence of evidence to support differences between occupational fields.

2. Physical Health

Civilian studies have indicated an association between the frequency of medical care within the last 12 months and committing suicide. However, this relationship has received little attention from the military. The DOD tracks access to physical, mental and support service care for those that attempt and die by suicide. In 2012, 67.7% of DOD suicide attempts and 61% of DOD suicide decedents accessed these services within 90 days of the event. Trofimovich et al. was the first to analyze the frequency and rates of primary care visits to eventual suicide and self-inflicted injury for the DOD. This study found that having received medical care within 30 days is associated with a higher rate of suicide. Specifically, "during 2001–2010, 45 percent of individuals who completed suicide and 75 percent of those who injured themselves had outpatient encounters within 30 days prior to suicide/self-harm" (Trofimovich, 2012, p. 2). The study also found the number of DOD medical visits within the period was excessive compared to the civilian population.

3. Deployment

DOD suicide rates may is associated with the increased number of deployments; however, supporting literature is conflicting. The Center for Naval Analysis identified multiple studies that show a statistically insignificant correlation between deployment and suicide. While an Army Study to Assess Risk and Resilience in Service members (Army STARRS) found that for active duty Army soldiers an increased risk of suicide was associated with current or previous deployment (Schoenbaum et al., 2014). Deployment is often used to proxy for combat experience as data is more readily available, but not all service members who complete a deployment are exposed to combat or have the same combat experiences that could affect other facets of their physical and mental health.

4. Transitions

Service members are required to transition between assignments, units, overseas and INCONUS locations, as well as between the civilian and military communities. These transitions can generate increased anxiety and stress, precipitate the loss of protective factors, and interrupt established medical care. Some think that the number of transitions experienced by military members may increase the prevalence and/or severity of suicide behavior risk factors (Task Force on the Prevention of Suicide by Members of the Armed Forces, 2010, p. 84). Lien et al. analyzed the effect of career transitions on enlisted USN suicide from 2001 to 2012 and found contradictory results. Specifically, They found that those who moved within the last 12 months or transitioned between sea or shore duty status within the last 12 months had a lower rate of suicide. However, Lien et al. did find a higher prevalence of suicide for those service members within 12 months of the end of obligated service (Lien et al., 2013a, pp. 54–57). "For 2007–2012, the suicide rate among enlisted Sailors within 12 months of their end of obligated service was 21.5 compared to 13.2 for Sailors who were not approaching the end of their active-duty obligation" (Lien et al., 2013a, p. 56).

E. NAVY-SPECIFIC SUICIDE RISK FACTORS

While the DOD has experienced an increase in suicide rates across all services, increasing from 10.3 in 2001 to 22.7 in 2012. (Ramchand, 2011, p. xiv; Smolenski, 2013), each individual service is impacted by suicide differently. Factors that vary among services include, among others, the age distribution, the quality of recruits (with regard to AFQT and education), career fields, and the number and type of missions/deployments. However, research is limited in areas that identify service specific suicide risk factors.

Most recently, Lien et al. conducted a study on non-demographic factors associated with suicide (2001-2012) resulting in two reports specific to the Navy, *Risk Factors Associated with Suicide: A Review of the Literature* and *DON Military Career Characteristics Associated with Suicide*. In addition to an extensive review of literature, Lien et al. conducted semi-structured interviews of subject matter experts and identified Navy career characteristic factors associated with suicide. Their findings support previous research that identified specific demographics, access to firearms, experiencing a loss (relational, financial, or career), physical and mental health, substance abuse, stigma, and transitions as common risk factors associated with military suicide. They further analyzed early career characteristics, basic career characteristics, loss of military career status, military career transitions, and deployments for AD Navy and Marine Corps service members. Sample size was a limiting factor in making associations between particular service specific factor and suicide, especially when evaluating the officer community and specific occupational fields.

Lien et al. recommended that additional research be conducted to analyze suicide risk factors associated with the reserve population, as this population is characteristically different. The suicide risk factors for the Selected Reserve component are largely unknown due to a variety of challenges. Selected Reservists shift between activated and reserve status that affect protective factors, access to both military and civilian medical care that do not correspond, and face economic and unemployment challenges. Additionally, insufficient tracking of both the total current Reserve population and the lack of a validated suicide-reporting requirement for non-activated reservists greatly reduces the information currently available.

Golliday (2014) analyzed the role of service specific risk factors in active duty Navy suicides for CY 2002-CY 2012. He found risk factors such as such as gender and race to be consistent with current literature. Specific to the active duty Navy population, he determined that enlisted supply ratings and non-moral accession waivers were associated with higher odds of suicide, while officer surface designators, undesignated enlisted rating, enlisted submarine and aircraft carrier assignments were associated with lower odds of suicide

This thesis continues and expands upon the research conducted by Golliday (2014). We examine the role of non-demographic, service-specific factors and pre-screening factors and the occurrence of suicide attempts and death by suicide for both the active and reserve Navy population.

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III. DATA AND METHODOLOGY

A. DATA

We use data from four different military and civilian sources: Defense Manpower Data Center (DMDC), Armed Forces Medical Examiner System (AFMES), Tricare, and the CDC National Death Index (NDI). These data sources are used to capture demographics, service-specific characteristics, mental health diagnoses, to include suicide attempts, and reported suicide deaths. Table 1 summarizes the data received from each data source.

Table 1. Summary of datasets used and their sources

22 quarterly sets of Navy demographic/service data 1 set of deployment data 1 set of reserve component indicator data	DMDC
1 set of suicide death data	AFMES
1 set of death data	NDI
4 sets of inpatient mental health disorders diagnosis data 4 sets of outpatient mental health disorders diagnosis data	Tricare

The DMDC database provides service member demographics, accession, career, and deployment information, and identifies all individuals that have ever served in the Reserve Component. DMDC is the DOD’s enterprise human resource information source. The DMDC database contains 21,468,856 observations on all Navy enlistees and officers between the fourth quarter of calendar year (CY) 1997 and the fourth quarter of CY 2012, which consisted of 1,010,113 of individual records. We aggregated quarterly data to the yearly level.

Data from Tricare provides inpatient and outpatient mental health disorder diagnosis information, including suicide attempts from both military and non-military providers for FY 2001- FY 2011. Tricare is the health care program that services active duty members, National Guard, Reserve members, retirees, and their families. Tricare information was provided in eight different data files (two per category, FY 2001 to FY 2006 and FY 2007 to FY 2011) to capture Standard Inpatient Data Record (SIDR), Tricare Encounter Data—Institutional (TEDI), Standard Ambulatory Data Record (SADR)/Comprehensive Ambulatory/Professional Encounter Record (CAPER), and Tricare Encounter Data—Non-Institutional (TEDN). SIDR captures inpatient care from Military Treatment Facilities (MTF) for personnel enrolled in Tricare. Records for those that receive inpatient care from a provider other than an MTF are included in the TEDI database. SADR/CAPER and TEDN records capture treatment received in the outpatient setting. Tricare data includes ICD-9 codes for diagnosed conditions, initial diagnosis dates, and additional visit dates for the condition for Army, Navy, Air Force and Marine Corps enlistees and officers from FY 2001 to FY 2011. For the purpose of our research, we use the ICD-9 codes to identify the following behavioral health conditions of interest: major depression, PTSD, substance abuse, and suicide attempt. For active duty service members, the Tricare data would capture all clinical encounters. Reserve Component members not in an activated status must pay a fee for Tricare medical coverage, as such not all Reserve members carry this coverage.

AFMES data identifies all deaths that occur while on active duty, which includes activated Reservists. The Office of the Armed Force Medical Examiner is responsible for conducting autopsies and determining the cause of death for all active duty and activated reserve personnel (Ramchand, 2011). Data provided by AFMES includes the month, year, and cause of death for every Sailor who has died on active duty from CY 2002 to CY 2012. During this period, there were 2,206 unique death observations, of which 449 were confirmed suicides. AFMES data does not capture deaths that occurred within the un-activated reserve population or after individuals leave the military. National Death Index data, which is the centralized death record database, was used to capture this information. NDI data includes the manner of death, date of death, and cause of death for 45,350 unique individuals. Combining the NDI and AFMES data allowed for a more inclusive and accurate sample. All data was linked utilizing an Electronic Data Interchange Personal Identifier Number (EDIPIN) to create a yearly panel data sample (one record for each year of military service) and an aggregate sample (one unique record per EDIPIN).

B. DEFINING ANALYTICAL SAMPLE

The linked data was used to develop four analytical samples. We conducted our analysis on the following Navy sub populations: active duty enlisted, reserve component enlisted, active duty officer, and reserve component officer.

The reserve variable indicates if a Sailor ever served in the Reserve Component. The presence of this indicator enables the differentiation between those that have only served on active duty during the entire study period and those that have ever served in the Reserve Component. This indicator provides additional granularity within the population and allows for insight into the characteristics of the Reserve Component population despite its incompleteness. Members of the military can transition between the active duty and reserve component throughout a career, yet the data does not allow for the identification of these transitions or delineate between those that were previously active duty. This results in possible bias in some variable estimates for the Reserve Component analysis.

For each of the data samples, we construct yearly data and an overall aggregated data. Enlisted and officer samples are separated due to differences in size, demographics, ability measurements (AFQT only available for enlistees), rank/rate (position in organization), and jobs (i.e., rating or designator). The enlisted sample consists of 3,219,849 person-year observations (2,419,896 AC, 799,899 RC) representing 667,336 unique Sailors (485,956 AC, 181,369 RC), while the officer sample contains 561,795 (406,978 AC, 154,811 RC) person-year observations representing 94,617 (62,998 AC, 31,618 RC) unique individuals. Yearly panel samples allow for the identification of changes from year to year, while the aggregate samples allow for the identification of overall trends with a greater level of accuracy.

C. KEY VARIABLES

1. Outcome Variables

We analyze two separate outcomes, whether a Sailor completed suicide (i.e., death by suicide) and whether a Sailor had been diagnosed with a suicide attempt (regardless of death outcome). The suicide death variable is an indicator for death that was ruled as a result of a suicide at any point during the applicable CY and is identified through a combination of AFMES and NDI data. The suicide attempt variable is an indicator for being diagnosed with attempting suicide, regardless of the end result, at any point during the applicable CY, and is identified through the Tricare clinical encounter data. We use ICD-9 codes of E950 through E958 to identify suicide attempts. It is important to note that the suicide attempt variable captures both individuals that successfully completed suicide (i.e., death by suicide) and those that did not. In addition, a person might die as a result of suicide without a clinical record of suicide attempt.

2. Demographic Variables

Demographic characteristics, as well as marital status and number of dependents are used as regressors in the logit regression models. We expect similar statistics and correlation results as were found with previous research. For gender, we include a male indicator that takes on a value of 1 if a Sailor is a male and 0 otherwise. An age variable represents how old a Sailor was on the last day of the CY. Age categories were developed from the age variable for each individual sample. Due to sample size restrictions each sample AC/RC enlisted and officer has a slightly different age category composition.

- AC Enlistees are grouped into the following age categories: 17–21, 22–24, 25–29, 30–34, 35–39, and 40 or more years.
- RC Enlistees are grouped into the following age categories: 17–21, 22–24, 25–29, 30–34, 35 or more years.
- Officers are grouped in the following age categories: 20–29, 30–34, 35–39, 40–44, and 45 or more years.

Individuals' race and ethnicity are captured together by the indicator variables white, black, other minority, unknown race, and Hispanic. The other minority category includes individuals that are Asian Pacific Islander, Native American or any race other than black or white. White serves as the reference group. The race and ethnic categories are mutually exclusive, such that an individual will only appear in a single category. Unlike enlisted regressions, officer regressions combine unknown race with the reference group (white) as less than 0.05% of the sample had an unknown race.

Marital status signifies the Sailor's status as of the last day of the applicable CY. The indicator variables married, never married, and divorced/separated/widowed are used to capture this information. Never married serves as the reference category. Additionally, a previous divorce variable is used to indicate if an individual was previously divorced, taking a value of 1 if divorced in the current or previous years and 0 otherwise. The dependents variable captures the number of dependents a Sailor had on the last day of the CY. Dependent information is grouped into the following categories: 0, 1, 2 or more dependents, where 0 dependents is the reference group.

AFQT score is used as a proxy for individual ability and is categorized into the following groups: category IV/V (score 1–30), category IIIB (score 31–49), category IIIA (score 50–64), category II (score 65–92), and category I (score 93–99). Category IV/V is the reference group. Observations with missing AFQT scores are categorized in as category IV/V. Additionally, a missing AFQT variable was created to represent those in the sample with a missing variable due to non-trivial amount of missing data associated with this variable. AFQT score is only used in the enlisted dataset, as officers are not required to take the AFQT for commissioning.

Accession waiver variables capture any waivers a Sailor required in order to enlist in the Navy and are categorized into the following groups: minor offense, major offense, other, or none, where those with no waivers are the reference group. Felony waivers are included as part of the major waiver category. Minor waivers primarily include traffic violations and drug waivers, while other waivers captures administrative waivers such as age and education waivers as well as mental waivers. Waiver information is not included in Officer analysis, as those that commission with a waiver is extremely small.

3. Service Specific Variables

a. Paygrades

Enlisted and officer paygrades are captured by rate (enlisted) and rank (officer) variables. The rate/rank variable reflects a Sailor's paygrade at the end of each CY. Paygrade categories were developed based on each individual sample:

- AC Enlistees: enlisted apprentice (E1-E4), enlisted journeyman (E5-E6), enlisted supervisor (E7-E9), where enlisted apprentice serves as the reference group.

- RC Enlistees: junior enlisted (E1-E4), mid-level enlisted (E-5), senior enlisted (E6-E9), where mid-level enlisted and senior enlisted are the reference group.
- Officers: junior officer (O1-O3), mid-level officer (O4-O5), senior officer (O7-O10), and warrant officer (WO2-WO5), where junior officer serves as the reference group.

b. Demotion

A demotion indicator variable is used to describe negative changes in rank from the previous calendar. Additionally, a previous demotion variable is used to capture if an individual was previously demoted, taking a value of 1 if demoted in the current or previous years and 0 otherwise. In the aggregated data, the elapsed time since demotion is captured by the variables one year post-demotion and two or more years post-demotion, where never demoted serves as the reference group. Demotion is a rare event in the Officer community; as such it is not used in the Officer analysis.

c. Enlisted Rating/Occupational Specialty and Officer Designator

Enlisted ratings and Officer designators are numerous and specific, which limits the number of observations within each group. We organize specific enlisted ratings and officer designators into more generalized and overarching categories listed below. Enlisted rating categories: air, operations, construction, supply, intelligence, engineering, weapons, medical, administration, and other rate. Due to sample size, the RC enlisted sample combines unknown ratings with the administration-rating group. Officer designator categories: surface/ship, submarine, administration, engineering, aviation, intelligence, medical, supply, and other designation. For both the enlisted and officer samples, the administration category serves as the reference group. Ratings and designator information is captured on the last day of the CY.

d. Primary Warfare Platform

Sailors can be assigned to a variety of platforms, whereas each platform is associated with a different mission set (type of work), culture, and physical environment. The following platform categories: shore, air, submarine, small ships, amphibious ship, aircraft carrier, other at-sea platforms, and unknown platform, where shore is the reference group. The small ship category includes minesweepers, frigates, destroyers, and cruisers. These categories are used to capture the type of warfare platform a Sailor was assigned to on the last day of the applicable CY. Platforms were further categorized for the RC enlisted and officer samples:

- RC Enlistees: shore, small ships, large ships, air platforms, and submarine platforms, where shore is the reference group. Large ships include aircraft carriers and amphibious ships.
- Officers: shore, small platforms, large platforms, and unknown platforms, where shore is the reference group. Small platforms include minesweepers, frigates, destroyers, cruisers, other sea platforms, and submarines. Large platforms include aircraft carriers, amphibious ships, and aviation platforms. These more refined categories were required because of the limited sample size.

e. Combat Zone Deployment

A deployment indicator variables is used to identify individuals that deployed to a combat zone at any time during the CY. The combat zone indicator variable takes on a value of 1 if a Sailor was deployed in the CY and 0 otherwise. Additionally, a previous combat zone deployment variable is used to capture if an individual was previously deployed, taking a value of 1 if deployed to a combat zone in the current or previous years and 0 otherwise. In accordance with Executive Order, the following areas are considered to be combat zones: Persian Gulf, Red Sea, Gulf of Oman, Arabian Sea, Gulf of Aden, Iraq, Kuwait, Saudi Arabia, Oman, Bahrain, Qatar, the United Arab Emirates, Kosovo, and Afghanistan (Executive Order No. 12,7444, 1991; Executive Order No. 13,119, 1999; Executive Order no. 13,239, 2001).

4. Diagnosed with Mental/Behavioral Health Condition Variables

We use diagnosed mental/behavioral health condition indicator variables to denote if a service member was diagnosed with any of the following conditions: depression, PTSD, substance use, or suicide attempt during the CY. ICD-9 codes are used to identify diagnoses. The PTSD variable identifies individuals diagnosed with PTSD (ICD-9 code 309.81) during the CY. The depression variable identifies individuals diagnosed with depression (ICD-9 code 296.2-296.3) during the CY. The substance abuse variable identifies individuals diagnosed with substance abuse (ICD-9 code 291–292, 303–305) during the CY and 0 otherwise. The suicide attempt identifies individuals diagnosed with a suicide attempt (ICD-9 code E950-E959) during the CY. The suicide attempt variable is used as part of the independent variable for all regressions where the outcome of interest is death by suicide.

In addition to the variables above that identify a current diagnosis, post diagnosis variables (for the nine conditions of interest) are used to capture if an individual was diagnosed with a mental health condition in the current or previous CY.

5. Year Cohorts

To capture unobservable cohort changes across calendar years, as well as unobserved individual life events, an indicator variable for each CY in the sample is used. CY 2002 is the reference group.

D. SUMMARY STATISTICS

General suicide attempt and death statistics for the active and reserve component enlisted and officer datasets for CY2002-CY2011 are in Table 2 through Table 5. The active and reserve datasets capture suicide deaths that occur outside of military service. The crude suicide rate is calculated using the following equation:

$$\text{Crude Suicide Rate} = \frac{\text{\# of suicide deaths in sample}}{\text{sample size}} * 100{,}000$$

This calculation is different than that used by DOD and DON, which utilizes average component populations as the denominator. Our research captures suicide deaths that occur after individuals transition out of the military, which prevents the use of average end strength. As such, the rates we calculate are not comparable to those presented by DODSER. Additionally, the crude suicide rate will not be calculated for any component that has less than 20 suicides deaths per year. Table 6 presents the total number of suicide attempt and death percentages for the dataset.

Table 2. Yearly Suicide Attempt and Suicide Death Statistics, Active Duty (AC) Enlisted, CY2002-CY2011

Year	Sample Size	Number of AC Suicide Attempts[1] in the Sample	Percentage of Total AC Suicide Attempts in the Sample	Number of AC Suicide Deaths[2] in the Sample	Percentage of Total AC Suicide Deaths in the Sample	Crude Suicide Rate (per 100,000 persons)
CY2002	259,478	1,256	10.06%	64	9.41%	24.7
CY2003	256,077	1,363	10.92%	99	14.56%	38.7
CY2004	250,350	1,421	11.38%	105	15.44%	41.9
CY2005	242,733	1,453	11.64%	83	12.21%	34.2
CY2006	236,928	1,410	11.30%	77	11.32%	32.5
CY2007	228,532	1,335	10.70%	57	8.38%	24.9
CY2008	228,494	1,301	10.42%	65	9.56%	28.4
CY2009	232,524	1,188	9.52%	49	7.21%	21.1
CY2010	237,347	1,004	8.04%	48	7.06%	20.2
CY2011	247,433	751	6.02%	33	4.85%	13.3
Total	2,419,896	12,482	100.00%	680	100.00%	28.1

Notes:

1. Suicide attempts reflect Tricare reports from January 2002 to September 2011.
2. Suicide deaths reflect NDI reports from January 2002 to December 2011 and capture deaths that occur beyond time of military service.

Active duty enlisted suicide attempt counts vary from year to year, but are on average between 1,100-1,200 attempts per year. CY2011 shows the lowest number of attempts in the observation window at 751, because we only observe 9 months during this CY. Beyond CY2004, reports of active duty enlisted suicide attempts and deaths continuously decrease at an approximate rate of 1–2% per year. Data from 2002 to 2011, captures 680 suicide deaths. During this time period, there were 502 officially reported active duty Navy suicides (including both enlisted, officer, and activated reservists) (Navy Personnel Command, 2014). Therefore, over 178 suicide deaths occurred when previous AC service members were no longer in the military. The active duty enlisted sample crude suicide rate peaks in CY2004 at 41.9 and reaches a minimum in CY2011 at 13.3. The sample average suicide rate during this ten-year period was 26.8.

Table 3. Yearly Suicide Attempt and Suicide Death Statistics, Reserve Component (RC) Enlisted, CY2002-CY2011

Year	Sample Size	Number of RC Suicide Attempts[1] in the Sample	Percentage of Total RC Suicide Attempts in the Sample	Number of RC Suicide Deaths[2] in the Sample	Percentage of Total RC Suicide Deaths in the Sample
CY2002	93,436	270	9.41%	14	10.07%
CY2003	96,967	309	10.77%	19	13.67%
CY2004	97,500	327	11.39%	25	17.99%
CY2005	92,708	340	11.85%	15	10.79%
CY2006	88,286	338	11.78%	15	10.79%
CY2007	82,662	311	10.84%	15	10.79%
CY2008	75,936	313	10.91%	14	10.07%
CY2009	68,539	278	9.69%	10	7.19%
CY2010	57,658	221	7.70%	9	6.47%
CY2011	46,207	163	5.68%	3	2.16%
Total	799,899	2,870	100.00%	139	100.00%

Notes:

1. Suicide attempts reflect Tricare reports from January 2002 to September 2011.
2. Suicide deaths reflect NDI reports from January 2002 to December 2011 and capture deaths that occur beyond time of military service.

The average Reserve enlisted suicide attempt count from 2002 to 2010 was 300 attempts per year. Similar to active enlisted, a decrease in the number of attempts starts in CY2005 and continues to CY2011. This same trend is seen for suicide deaths. CY2011 marks a substantial decrease in the number of suicide deaths, representing approximately 2% of the total suicides that occurred during the observation period.

Table 4. Yearly Suicide Attempt and Suicide Death Statistics, Active Duty (AC) Officer, CY2002-CY2011

Year	Sample Size	Number of AC Suicide Attempts[1] in the Sample	Percentage of Total AC Suicide Attempts in the Sample	Number of AC Suicide Deaths[2] in the Sample	Percentage of Total AC Suicide Deaths in the Sample
CY2002	42,377	32	9.07%	5	13.16%
CY2003	41,978	33	9.35%	7	18.42%
CY2004	41,658	34	9.63%	2	5.26%
CY2005	41,055	37	10.48%	7	18.42%
CY2006	40,450	37	10.48%	3	7.89%
CY2007	39,934	41	11.61%	5	13.16%
CY2008	39,550	42	11.90%	3	7.89%
CY2009	39,584	34	9.63%	1	2.63%
CY2010	39,917	33	9.35%	3	7.89%
CY2011	40,475	30	8.50%	2	5.26%
Total	406,978	353	100.00%	38	100.00%

Notes:
1. Suicide attempts reflect Tricare reports from January 2002 to September 2011.
2. Suicide deaths reflect NDI reports from January 2002 to December 2011 and capture deaths that occur beyond time of military service.

Active duty officer suicide attempt counts are relatively stable over the observation period, with an average of approximately 36 attempts per year (not taking CY2011 into account). CY2008 marks the peak of suicide attempts. Suicide death counts for active duty officer’s range for 1–7 suicide deaths per year. CY2003 and CY2005 mark the peak of suicide deaths, while CY2009 marks the lowest observed number of deaths.

Table 5. Yearly Suicide Attempt and Suicide Death Statistics, Reserve Component (RC) Officer, CY2002-CY2011

Year	Sample Size	Number of RC Suicide Attempts[1] in the Sample	Percentage of Total RC Suicide Attempts in the Sample	Number of RC Suicide Deaths[2] in the Sample	Percentage of Total RC Suicide Deaths in the Sample
CY2002	15,462	13	8.18%	0	0.00%
CY2003	16,225	16	10.06%	1	11.11%
CY2004	16,567	18	11.32%	0	0.00%
CY2005	15,571	17	10.69%	3	33.33%
CY2006	15,006	17	10.69%	0	0.00%
CY2007	14,822	15	9.43%	2	22.22%
CY2008	15,045	20	12.58%	0	0.00%
CY2009	15,323	17	10.69%	0	0.00%
CY2010	15,346	14	8.81%	1	11.11%
CY2011	15,444	12	7.55%	2	22.22%
Total	154,811	159	100.00%	9	100.00%

Notes:

1. Suicide attempts reflect Tricare reports from January 2002 to September 2011.
2. Suicide deaths reflect NDI reports from January 2002 to December 2011 and capture deaths that occur beyond time of military service.

Similar to active officers, reserve component officer suicide attempt counts are relatively stable over the observation period. Suicide attempts range from 12–20 attempts per year over the observation period. CY2008 marks the peak of suicide attempts. Suicide death counts for reserve component officers are extremely low ranging from 0 to 3 deaths per year.

Table 6. Active and Reserve Component Suicide Attempt and Death Percentage

	Number of Suicide Attempts	Number of Suicide Deaths	Number of Suicide Deaths with a Previous Suicide Attempt	Percentage of Suicide Attempts that Result in Death	Percentage of Suicide Deaths with a Previous Suicide Attempt
Enlisted	15,352	819	39	0.25%	4.76%
Officer	512	47	2	0.39%	4.26%
Total	15,864	866	41	0.26%	4.73%

From CY 2002 to CY 2011, 15,864 suicide attempts and 866 suicide deaths were reported. Of the total suicide deaths that occurred, only 41 individuals had previously been diagnosed with a suicide attempt, representing 4.73 percent. Additionally, less than 1 percent of suicide attempts resulted in death.

E. DESCRIPTIVE STATISTICS

We generated datasets for each population: active duty enlisted, enlisted reserve component, active duty officers, and reserve component officers. The aggregated datasets (one observation per Sailor) captures associations between suicide attempt and suicide death, as well as particular mental health diagnoses, between CY2002 and 2011. Each descriptive statistics table consists of the mean and one standard deviation from the mean. Reserve component officers are not included due to insufficient results.

1. Active Duty Enlisted Dataset

a. Mental Health Conditions

According to Table 7, over the observation period, an average rate of 120.5 active duty personnel per 100,000 attempt suicide and 28.1 per 100,000 die by suicide.

Table 7. Descriptive Statistics of Suicide and Mental Health Conditions for Active Duty Enlisted

Outcomes: Suicide Attempt and Death		
Variable	**Mean**	**Std. Dev.**
Suicide Attempt	0.60%	0.0771
Suicide Death	0.14%	0.0374
Mental Health Diagnoses		
Variable	**Mean**	**Std. Dev.**
PTSD	1.96%	0.1386
Depression	3.02%	0.1713
Substance Use	1.79%	0.1326
Previous Suicide Atttempt	0.56%	0.0746

b. Demographic and Service-Specific Characteristics

Tables 8 and 9 represent the general characteristics of Navy active duty personnel. Majority of the Sailors are male (84%), more than 60% are less than thirty years old, 55% white, 57% married, almost 40% have two or more dependents, 37.5% score between 65–

92 on the AFQT, 83% join the Navy with no waiver, more than 90% have never been demoted, E1-E4 makes up 70% of active enlisted personnel, more than 30% do not have a designated rating, more than 50% have never been deployed to a combat zone, and greater than 96% are attached to a shore command.

Table 8. Descriptive Statistics of Demographics and Pre-Enlisted Screening Characteristics for Active Duty Enlisted

Variable	Mean	Std. Dev.
Male	84.17%	0.3650
Female	15.69%	0.3637
Age 17-21	22.93%	0.4204
Age 22-24	17.09%	0.3764
Age 25-29	21.36%	0.4099
Age 30-34	11.52%	0.3193
Age 35-39	13.07%	0.3371
Age 40+	14.02%	0.3472
White	55.27%	0.4972
Black	21.26%	0.4091
Hispanic	13.76%	0.3444
Other Minority	4.61%	0.2096
Unknown Race	12.54%	0.3312
Never Married	53.11%	0.4990
Married	57.33%	0.4946
Divorced/Separated/Widowed	34.89%	0.4766
No Dependents	42.61%	0.4945
1 Dependent	18.03%	0.3844
2+ Dependents	39.36%	0.4886
AFQT Score 0-31	5.43%	0.2266
AFQT Score 31-49	26.16%	0.4395
AFQT Score 50-64	24.63%	0.4309
AFQT Score 65-92	37.52%	0.4842
AFQT Score 93-100	6.25%	0.2421
Missing AFQT Score	3.65%	0.1875
No Waiver	83.27%	0.3733
Minor Waiver	1.08%	0.1033
Major Waiver	4.05%	0.1972
Drug Waiver	0.52%	0.0716
Felony Waiver	0.13%	0.0362
Mental Health Waiver	0.11%	0.0327
Other Waiver	11.65%	0.3209

Table 9. Descriptive Statistics of Service-Specific Factors for Active Duty Enlisted

Variable	Mean	Std. Dev.
Ever Demoted	8.39%	0.2772
Enlisted Apprentice (E1-E4)	69.82%	0.4591
Enlisted Journeyman (E5-E6)	47.87%	0.4995
Enlisted Supervisor (E7-E9)	15.00%	0.3571
Administrative Ratings	4.73%	0.2124
Air Ratings	24.24%	0.4285
Operations Ratings	9.16%	0.2885
Construction Ratings	2.27%	0.1489
Other Rating	2.57%	0.1583
Supply Ratings	7.39%	0.2615
Intelligence Ratings	14.12%	0.3482
Engineering Ratings	18.25%	0.3863
Weapons Ratings	7.96%	0.2707
Medical Ratings	8.78%	0.2830
Undesignated Ratings	31.45%	0.4643
Unknown Rating	3.27%	0.1778
Deployed to combat zone	45.38%	0.4979
Minesweeper Platforms	0.92%	0.0956
Destroyer Platforms	9.77%	0.2970
Cruiser Platforms	5.53%	0.2286
Frigate Platforms	3.54%	0.1848
Unknown Platform	0.27%	0.0514
Shore Facilities	96.41%	0.1860
Small Platforms	17.40%	0.3791
Air Platforms	10.86%	0.3112
Amphibious Platforms	12.75%	0.3335
Aircraft Carrier Platforms	18.63%	0.3893
Submarine Platforms	6.56%	0.2475
Other Sea Platforms	3.19%	0.1756

2. Reserve Component Enlisted Dataset

a. Mental Health Conditions

According to Table 10, the average rate of suicide attempts is 72.6 and 18.1 for suicide deaths, per 100,000, over the observation period. Enlisted reserve personnel who attempted suicide and/or died by suicide were diagnosed with depression more so than other mental health conditions from 2002–2011.

Table 10. Descriptive Statistics of Suicide and Mental Health Conditions for Reserve Component Enlisted

Outcomes: Suicide Attempt and Death		
Variable	**Mean**	**Std. Dev.**
Suicide Attempt	0.32%	0.0566
Suicide Death	0.08%	0.0277
Mental Health Diagnoses		
Variable	**Mean**	**Std. Dev.**
PTSD	1.45%	0.1196
Depression	1.95%	0.1383
Substance Use	1.01%	0.1002
Previous Suicide Atttempt	0.31%	0.0552

b. Demographic and Service-Specific Characteristics

Tables 11 and 12 represent the general characteristics of the Navy reserve enlisted personnel. Majority of the Sailors are male (81.3%), nearly 90% are less than 30 years old, 58% white, 71% married, 58% have no dependents, 34% have ever scored between 65–92 on the AFQT, 82% join the Navy with no waiver, 10.75% have ever been demoted, E1-E4 makes up 90% of reserve enlisted personnel, more than 63% have air or undesignated ratings, more than 58% have never been deployed to a combat zone and greater than 87.5% have ever been attached to a shore command.

Table 11. Descriptive Statistics of Demographics and Pre-Enlisted Screening Characteristics for Reserve Component Enlisted

Variable	Mean	Std. Dev.
Male	0.812708	0.390147
Female	0.186995	0.389908
Age 17-21	11.93%	0.3242
Age 22-24	48.78%	0.4999
Age 25-29	28.22%	0.4501
Age 30-34	7.59%	0.2648
Age 35 or more	3.48%	0.1832
White	58.41%	0.4929
Black	17.23%	0.3777
Hispanic	15.94%	0.3660
Other minority	12.48%	0.3305
Unknown race	4.16%	0.1996
Married	70.64%	0.4554
Never Married	43.47%	0.4957
Divorced/Separated/Widowed	34.26%	0.4746
No Dependents	58.11%	0.4934
1 Dependent	23.35%	0.4230
2 or more Dependents	18.54%	0.3886
AFQT Score 0-31	5.84%	0.2345
AFQT Score 31-49	29.32%	0.4552
AFQT Score 50-64	25.38%	0.4352
AFQT Score 65-92	34.12%	0.4741
AFQT Score 93-100	5.34%	0.2247
Missing AFQT Score	5.66%	0.2310
No Waiver	82.26%	0.3820
Other Waiver	11.93%	0.3241
Minor Waiver	1.30%	0.1134
Major Waiver	4.58%	0.2091

Table 12. Descriptive Statistics of Service-Specific Factors for Reserve Component Enlisted

Variable	Mean	Std. Dev.
Ever Demoted	10.75%	0.3097
E1-E4	89.88%	0.3015
E5	35.31%	0.4779
E6-E9	4.45%	0.2061
Administrative Ratings	6.29%	0.2428
Air Ratings	30.62%	0.4609
Operations Ratings	10.20%	0.3026
Construction Ratings	2.06%	0.1419
Other Rating	2.53%	0.1570
Supply Ratings	7.18%	0.2581
Intelligence Ratings	12.87%	0.3349
Engineering Ratings	18.32%	0.3868
Weapons Ratings	8.49%	0.2787
Medical Ratings	9.51%	0.2934
Undesignated Ratings	32.94%	0.4700
Deployed to combat zone	57.86%	0.4938
Shore Facilities	87.53%	0.3304
Small Platform	19.84%	0.3988
Large Platforms	38.07%	0.4856
Air Platforms	8.85%	0.2840
Submarine Platforms	4.78%	0.2134

3. Active Duty Officer Dataset

a. Mental Health Conditions

According to Table 13, the average rate of suicide attempts is 13.9 and 9.3 for suicide deaths, per 100,000, over the observation period. Active duty officers who attempted suicide and/or died by suicide were diagnosed with depression more so than other mental health conditions from 2002–2011.

Table 13. Descriptive Statistics of Suicide and Mental Health Conditions for Active Duty Officers

Outcomes: Suicide Attempt and Death		
Variable	**Mean**	**Std. Dev.**
Suicide Attempt	0.09%	0.0306
Suicide Death	0.06%	0.0246
Mental Health Diagnoses		
Variable	**Mean**	**Std. Dev.**
PTSD	1.15%	0.1068
Depression	1.95%	0.1384
Substance Use	0.51%	0.0715
Previous Suicide Atttempt	0.09%	0.0306

b. Demographic and Service-Specific Characteristics

Tables 14 and 15 represent the general characteristics of Navy active duty officers. Majority of the active officers are male (86%), 82% are older than 29 years, 84% white, 80% married, almost 66% have two or more dependents, O1-O3 makes up 60% of active duty officers, 47% have either air or surface designators, 49% have been deployed to a combat zone, and greater than 97% have ever been attached to a shore command.

Table 14. Descriptive Statistics of Demographics for Active Duty Officers

Variable	**Mean**	**Std. Dev.**
Male	86.09%	0.3460
Female	13.95%	0.3465
Age 20-29	17.98%	0.3840
Age 30-34	13.43%	0.3410
Age 35-39	14.90%	0.3561
Age 40-44	23.81%	0.4259
Age 45+	29.87%	0.4577
White	83.79%	0.3685
Black	8.76%	0.2827
Hispanic	5.84%	0.2346
Other Minority	5.63%	0.2306
Never Married	26.97%	0.4438
Married	80.41%	0.3969
Divorced/Separated/Widowed	32.55%	0.4686
No Dependents	19.01%	0.3924
1 Dependent	15.21%	0.3592
2 or more Dependents	65.77%	0.4745

Table 15. Descriptive Statistics of Service-Specific Factors for Active Duty Officers

Variable	Mean	Std. Dev.
Junior Officer (O1-O3)	63.07%	0.4826
Mid-level Officer (O4-O5)	49.80%	0.5000
Senior Officer (O6-O10)	13.60%	0.3428
Warrant Officer (WO2-WO5)	5.59%	0.2297
Administrative Designator	8.51%	0.2790
Other Designator	10.84%	0.3108
Surface Designator	20.99%	0.4072
Submarine Designator	9.68%	0.2957
Engineering Designator	3.84%	0.1920
Air Designator	25.86%	0.4378
Intelligence Designator	6.62%	0.2487
Medical Designator	17.63%	0.3811
Supply Designator	5.54%	0.2287
Deployed to a Combat Zone	48.89%	0.4999
Shore Facilities	97.10%	0.1677
Small Platforms	22.61%	0.4183
Large Platforms	27.78%	0.4479
Unknown Platforms	33.36%	0.4715

4. Reserve Component Officer Dataset

a. Mental Health Conditions

According to Table 16, the average rate of suicide attempts is 20.4 and 6.1 for suicide deaths, per 100,000, over the observation period. Reserve component officers who attempted suicide and/or died by suicide were diagnosed with depression more so than other mental health conditions from 2002–2011.

Table 16. Descriptive Statistics of Suicide and Mental Health Conditions for Reserve Component Officers

Outcomes: Suicide Attempt and Death		
Variable	**Mean**	**Std. Dev.**
Suicide Attempt	0.10%	0.0318
Suicide Death	0.03%	0.0169
Mental Health Diagnoses		
Variable	**Mean**	**Std. Dev.**
PTSD	0.77%	0.0875
Depression	1.85%	0.1349
Substance Use	0.36%	0.0599
Previous Suicide Atttempt	0.10%	0.0318

b. Demographic and Service-Specific Dataset

Tables 17 and 18 represent the general characteristics of Navy reserve component officers. Majority of the reserve officers are male (77%), 47% are younger than 30 years old, 84% white, 59% have ever been married, almost 42% have two or more dependents, O1-O3 makes up more than 94% of reserve officers, 48% have either air or surface designators, 42% have ever been deployed to a combat zone, and greater than 92% have ever been attached to a shore command.

Table 17. Descriptive Statistics of Demographics for Reserve Component Officers

Variable	Mean	Std. Dev.
Male	76.86%	0.4217
Female	23.26%	0.4225
Age 20-29	46.84%	0.4990
Age 30-34	31.09%	0.4629
Age 35-39	12.88%	0.3349
Age 40-44	5.48%	0.2277
Age 45+	3.71%	0.1889
White	83.92%	0.3674
Black	6.95%	0.2544
Hispanic	5.94%	0.2364
Other Minority	6.91%	0.2536
Never Married	53.09%	0.4991
Married	58.83%	0.4922
Divorced/Separated/Widowed	36.41%	0.4812
No Dependents	33.78%	0.4730
1 Dependent	24.62%	0.4308
2 or more Dependents	41.60%	0.4929

Table 18. Descriptive Statistics of Service-Specific Factors for Reserve Component Officers

Variable	Mean	Std. Dev.
Junior Officer (O1-O3)	94.65%	0.2251
Mid-level Officer (O4-O5)	18.89%	0.3914
Senior Officer (O6-O10)	0.78%	0.0879
Warrant Officer (WO2-WO5)	0.09%	0.0308
Administrative Designator	6.45%	0.2457
Other Designator	11.00%	0.3129
Surface Designator	22.97%	0.4206
Submarine Designator	8.90%	0.2848
Engineering Designator	1.26%	0.1114
Air Designator	25.03%	0.4332
Intelligence Designator	2.85%	0.1665
Medical Designator	27.58%	0.4469
Supply Designator	3.92%	0.1941
Deployed to a Combat Zone	42.22%	0.4939
Shore Facilities	92.91%	0.2566
Small Platforms	26.20%	0.4397
Large Platforms	22.72%	0.4190
Unknown Platforms	34.88%	0.4766

F. METHODS

We estimate separate logit regression models to study the odds of two suicide measures as a function of service members' demographics, service-specific and mental health characteristics: (1) death by suicide and (2) being diagnosed with a suicide attempt. For the ease of interpretation, we report the results in odds ratios (OR). Odds ratios are the exponentiated form of the regression coefficient, which represents the likelihood that the outcome (suicide or suicide attempt) will occur given the presence of a specific variable. If the odds ratio equals one, the independent variable does not affect the outcome (suicide attempt or suicide death). Holding all else constant, an odds ratio less than one for any given independent variable is associated with lower odds of the dependent variable, suicide attempt or death by suicide. Conversely, an odds ratio greater than one, holding all else constant, indicates the independent variable is associated with higher odds of the outcome.

We estimate multiple logit models for each dataset of interest. We run each model independently for the active duty and reserve component. Regressions were not performed on the Reserve Officer sample, as the occurrence of suicide attempts and suicide deaths in the sample was too small at 159 and 9 respectively (out of 154,811 sample size). The following specification is used for all models:

$$Prob(y_i = 1 \mid x_{ik}) = F(\beta_0 + \beta_k x_{ik} + \varepsilon_i)$$

where the probability that the outcome variable y (suicide or suicide attempt) occurs for individual i if 1, given all independent x variables is equal to the log function of a linear regression model. β_0 is the intercept parameter, β_k is the log of odds for each corresponding independent x variable at variable number k, and ε_i is the error term for individual i.

To analyze the outcome of dying by suicide, multiple regression models are estimated for the yearly and aggregate Enlisted and Officer samples. Each model builds on the previous model by incorporating additional variables. Model 1 for all samples includes only demographic characteristics. Model 2 includes demographics and service-specific characteristics. Models 3 and beyond include demographics, service-specific characteristics, and combinations of current diagnosed suicide attempt, previously diagnosed suicide attempt and the additional mental health diagnosis indicators for PTSD, depression, and substance abuse. The reported results for the final model include the following mental health variables:

- AC Enlisted Yearly Sample: current suicide attempt, previous suicide attempts, previous PTSD diagnosis, previous depression diagnosis, and previous substance use diagnosis.
- RC Enlisted Yearly Sample: suicide attempts, previous PTSD diagnosis, previous depression diagnosis, and previous substance use diagnosis.
- AC Officer Yearly Sample: current suicide attempt, previous suicide attempts, previous depression diagnosis, and previous substance use diagnosis. Previous PTSD diagnosis is not included in the model due to perfect prediction and a sample size of less than 1%.
- Enlisted Aggregate (AC/RC): suicide attempt, PTSD, depression, and substance use.
- AC Officer Aggregate: suicide attempt, depression, and substance use.

To evaluate the outcome of being diagnosed with a suicide attempt three models are used for each sample. Models 1 and 2 described above are unchanged. Model 3 includes demographics, service-specific characteristics, and diagnosed mental health indicators for PTSD, depression, and substance abuse.

Death by suicide and attempting suicide are not the results of one single variable, but rather a combination of multiple factors that place an individual at a higher risk of these events occurring. As such, this thesis does not identify specific characteristics or factors that cause suicide, but rather identifies those items that are associated or correlated with these events occurring. The interdependence of these variables ensures that some level of omitted variable bias is present.

Aspects of this analysis are limited due to the data available, which may introduce bias into the estimation results. Primarily, the incomplete nature of the Reserve data causes the results to be non-generalizable for the entire Reserve population. The inability to capture transitions between the active and reserve components of the Navy limits the composition of the sample such that individuals that have only served in the reserves or those that have served in both the active and reserve component are not clearly identified, but rather grouped together in the reserve sample. This introduces bias as it is assumed that those Reservists that were never on active duty have not been exposed to military characteristics and stressors, such that they are more comparable to the civilian population. Additionally, mental health diagnoses data for the reserve component is only capturing a portion of diagnoses that are made, as not all reserve members carry Tricare coverage. To our knowledge there is no clear or direct tracking mechanism for reporting such mental health conditions within the reserve component. Finally, no proxy for ability is used for the officer sample.

IV. RESULTS

The resulting odds ratios from each logistic regression are discussed when controlling for demographics, service-specific factors, and mental health conditions and include only those variables statistically significant at the 1% and 5% level.

A. ACTIVE DUTY ENLISTED

1. Yearly Observations Logit Regression Results for Suicide Attempt

Table 19 contains the logit regression results for the active duty enlisted sample of yearly observations for the outcome of a current suicide attempt. On average, the odds of suicide attempts increased by 1.3 times after a person was diagnosed with PTSD; and the odds increased by 7.8 and 6.5 times, respectively, after a sailor was diagnosed with depression, and substance use, respectively. These findings are consistent with current research that identifies mental health conditions as common risk factors for suicide attempts and death (Suicide Prevention Resource Center, 2011; Ramchand et al., 2011).

Upon examination of statistically significant demographic variables, males are 47% less likely than females to attempt suicide, which is consistent with past research. Additionally, all age groups greater than the 17–21 reference group have lower odds of attempting suicide. This concurs with CDC findings that young adults are more likely to attempt suicide (CDC, 2012). Across all models, African Americans and other minorities are 18–14% less likely to commit a suicide attempt than whites (the reference group). Active duty enlisted personnel who are married are 1.6 times more susceptible to attempting suicide than individuals who have never been married, whereas personnel previously divorced have 40% lower odds. Active enlistees with two or more dependents are 19% less likely to attempt suicide than those with no dependents. AFQT scores and waivers are not statistically significant and therefore cannot be interpreted when controlling for demographics, service-specific factors, and specified mental health conditions. Active duty enlisted personnel had higher odds of attempting suicide in CY2004-CY2011 than CY2002.

On average, when controlling for demographics and service-specific factors, enlistees previously demoted were 2.1 times more likely to attempt suicide than those never demoted. This result provides additional insight on suicide attempts, as it supports previous findings that negative life events and/or hardships, specifically demotion, increase the risk of dying by suicide (Lien et al., 2011a). When evaluating paygrade, enlisted journeymen and supervisors were 59% and 78%, respectively, less likely to attempt suicide than enlisted apprentices. Undesignated, unknown, intelligence and other ratings were found to be statistically significant. When compared to administrative ratings, those sailors with unknown ratings were 1.5 times more likely to attempt suicide, while undesignated, intelligence and other ratings were less likely to attempt suicide. Having been deployed to a combat zone does not increase the odds that a sailor will attempt suicide. In fact, these sailors had 52% lower odds of attempting suicide compared to those that have never been deployed to a combat zone. With the exception of other sea platforms, those with primary assignment to surface ships (minesweepers, frigates, destroyers, cruisers, amphibious, aircraft carriers) have an increased risk for attempting suicide compared to those attached to a shore platform.

Table 19. Suicide Attempt: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Outcome	Current Attempt	Current Attempt	Current Attempt
Observations	2,416,778	2,416,778	2,416,778
Constant	0.00364***	0.00414***	0.00233***
	(0.00100)	(0.00117)	(0.000664)
Mental Health Diagnoses			
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			1.330***
			(0.104)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			7.829***
			(0.477)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			6.495***
			(0.423)
Demographics			
Female (ref group)	1	1	1
Male	0.415***	0.420***	0.526***
	(0.0182)	(0.0188)	(0.0247)
Age 17-21 (ref group)	1	1	1
Age 22-24	0.760***	0.863***	0.810***
	(0.0382)	(0.0450)	(0.0430)
Age 25-29	0.367***	0.606***	0.546***
	(0.0233)	(0.0421)	(0.0383)
Age 30-34	0.215***	0.494***	0.431***
	(0.0190)	(0.0484)	(0.0424)
Age 35-39	0.159***	0.477***	0.414***
	(0.0166)	(0.0578)	(0.0502)
Age 40+	0.0948***	0.345***	0.299***
	(0.0137)	(0.0576)	(0.0492)
White (ref group)	1	1	1
Black	0.833***	0.750***	0.864***
	(0.0450)	(0.0409)	(0.0478)
Other Minority	0.827***	0.771***	0.815***
	(0.0529)	(0.0496)	(0.0532)
Unknown Race	0.648**	0.594**	0.651*
	(0.141)	(0.130)	(0.143)
Hispanic	0.909	0.850***	0.886*
	(0.0562)	(0.0527)	(0.0560)
Never Married (ref group)	1	1	1
Married	1.643***	1.669***	1.618***
	(0.110)	(0.112)	(0.109)
Not Previously Divorced (ref group)	1	1	1
Previously Divorced	0.536***	0.551***	0.559***
	(0.0226)	(0.0236)	(0.0245)

Table 19 (cont'd). Suicide Attempt: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
No Dependents (ref group)	1	1	1
One Dependent	0.923	0.925	0.905
	(0.0650)	(0.0650)	(0.0638)
Two or more Dependents	0.734***	0.812**	0.806***
	(0.0611)	(0.0672)	(0.0664)
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	0.868	0.844	0.768
	(0.226)	(0.220)	(0.201)
AFQT Score 50-64	0.931	0.982	0.846
	(0.243)	(0.256)	(0.222)
AFQT Score 65-92	0.948	1.097	0.955
	(0.247)	(0.287)	(0.250)
AFQT Score 93-100	1.086	1.304	1.095
	(0.293)	(0.354)	(0.298)
Any AFQT Score (ref group)	1	1	1
Missing AFQT Score	0.924	0.974	0.834
	(0.255)	(0.269)	(0.232)
No Waiver (ref group)	1	1	1
Other Waiver	1.077	1.054	0.987
	(0.0666)	(0.0655)	(0.0623)
Minor Waiver	1.302	1.175	1.116
	(0.217)	(0.196)	(0.194)
Major Waiver	1.295***	1.229**	1.108
	(0.122)	(0.116)	(0.106)
Service-Specific Factors			
Not Previously Demoted (ref group)		1	1
Previously Demoted		2.470***	2.084***
		(0.162)	(0.143)
Enlisted Apprentice (E1-E4) (ref group)		1	1
Enlisted Journeyman (E5-E6)		0.347***	0.408***
		(0.0224)	(0.0265)
Enlisted Supervisor (E7-E9)		0.162***	0.218***
		(0.0252)	(0.0338)
Administrative Ratings (ref group)		1	1
Air Ratings		0.877	0.929
		(0.0722)	(0.0780)
Operations Ratings		1.085	1.055
		(0.101)	(0.101)
Construction Ratings		0.774	0.699*
		(0.141)	(0.130)
Other Ratings		0.644**	0.607***
		(0.117)	(0.111)
Supply Ratings		1.192*	1.205*
		(0.112)	(0.116)

Table 19 (cont'd). Suicide Attempt: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Intelligence Ratings		0.807**	0.820**
		(0.0706)	(0.0733)
Engineering Ratings		0.875	0.846*
		(0.0754)	(0.0747)
Weapons Ratings		0.909	0.864
		(0.0902)	(0.0878)
Medical Ratings		1.098	0.850*
		(0.0973)	(0.0786)
Undesignated Ratings		0.700***	0.719***
		(0.0513)	(0.0539)
Unknown Ratings		1.506**	1.490**
		(0.294)	(0.300)
Not Deployed to combat zone (ref group)		1	1
Deployed to combat zone		0.448***	0.476***
		(0.0335)	(0.0358)
Not Previously Deployed to Combat Zone (ref group)		1	1
Prior Deployment to Combat Zone		1.095	1.055
		(0.0618)	(0.0600)
Shore Facilities (ref group)		1	1
Small Platforms		1.315***	1.311***
		(0.0889)	(0.0895)
Air Platforms		1.182*	1.096
		(0.108)	(0.101)
Amphibious Platforms		1.695***	1.746***
		(0.115)	(0.120)
Aircraft Carrier Platforms		1.355***	1.500***
		(0.0810)	(0.0906)
Submarine Platforms		0.905	0.950
		(0.100)	(0.106)
Other Sea Platforms		1.087	1.145
		(0.187)	(0.199)
Year Cohorts			
CY2002 (ref group)	1	1	1
CY2003	1.161	1.109	1.123
	(0.118)	(0.113)	(0.115)
CY2004	1.489***	1.334***	1.367***
	(0.144)	(0.131)	(0.135)
CY2005	1.772***	1.570***	1.619***
	(0.167)	(0.151)	(0.158)
CY2006	2.011***	1.804***	1.870***
	(0.188)	(0.171)	(0.180)
CY2007	1.911***	1.750***	1.836***
	(0.182)	(0.171)	(0.181)

Table 19 (cont'd). Suicide Attempt: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
CY2008	2.000***	1.814***	1.988***
	(0.188)	(0.176)	(0.195)
CY2009	1.863***	1.677***	1.966***
	(0.176)	(0.163)	(0.194)
CY2010	1.663***	1.459***	1.880***
	(0.159)	(0.144)	(0.189)
CY2011	1.024	0.893	1.283**
	(0.107)	(0.0947)	(0.139)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

2. Aggregated Logit Regression Results for Suicide Attempt

Table 20 contains the logit regression results for the active duty enlisted sample of aggregate observations (one observation per sailor) for the outcome of a reported suicide attempt. Mental health diagnoses results from the aggregate sample are analogous with results from the yearly sample. Sailors that were ever diagnosed with PTSD, depression, or substance use have increased odds of attempting suicide by 1.7, 8.7, and 7.2 times, respectively.

Demographic results using the aggregated sample showed some differences, such that African Americans were no longer significant and Hispanics had 12% lower odds of attempting suicide than whites. Those sailors with two or more dependents or previously divorced, separated, or widowed were no longer statistically significant.

When service-specific variables are aggregated an abundance of additional enlisted ratings become significant. Air, operations, medical, and supply ratings were all greater than 1.3 times more likely to attempt suicide, compared to those in the administrative field. While those attached to small ships, amphibious platforms, and aircraft carriers remain at an increased likelihood of attempting suicide, those personnel who have ever been attached to a submarine and other platforms were also more likely to attempt suicide. On further analysis of sailors previously demoted, on average, those one-year and two plus years post demotions were 1.3 times more susceptible to attempt suicide than those never demoted.

Table 20. Suicide Attempt: Active Duty Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Attempt	Suicide Attempt	Suicide Attempt
Observations	485,956	485,956	485,956
Constant	0.0166***	0.0111***	0.00716***
	(0.00424)	(0.00290)	(0.00190)
Mental Health Diagnoses			
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			1.660***
			(0.117)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			8.667***
			(0.412)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			7.205***
			(0.383)
Demographics			
Female (ref group)	1	1	1
Male	0.461***	0.452***	0.554***
	(0.0191)	(0.0192)	(0.0247)
Age 17-21 (ref group)	1	1	1
Age 22-24	0.870***	0.854***	0.767***
	(0.0441)	(0.0442)	(0.0409)
Age 25-29	0.579***	0.670***	0.575***
	(0.0328)	(0.0425)	(0.0375)
Age 30-34	0.393***	0.531***	0.436***
	(0.0316)	(0.0486)	(0.0409)
Age 35-39	0.268***	0.453***	0.374***
	(0.0247)	(0.0493)	(0.0413)
Age 40+	0.138***	0.269***	0.231***
	(0.0160)	(0.0369)	(0.0320)
White (ref group)	1	1	1
Black	0.884**	0.794***	0.949
	(0.0445)	(0.0405)	(0.0495)
Other Minority	0.757***	0.734***	0.798***
	(0.0447)	(0.0435)	(0.0483)
Unknown Race	1.020	0.956	1.036
	(0.123)	(0.116)	(0.127)
Hispanic	0.872**	0.831***	0.879**
	(0.0501)	(0.0479)	(0.0520)
Never Married (ref group)	1	1	1
Married	1.425***	1.453***	1.383***
	(0.105)	(0.108)	(0.106)
Divorced/Separated/Widowed	0.923	0.891**	0.908*
	(0.0496)	(0.0496)	(0.0529)

Table 20 (cont'd). Suicide Attempt: Active Duty Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
No Dependents (ref group)	1	1	1
One Dependent	1.002	0.978	0.940
	(0.0676)	(0.0657)	(0.0646)
Two or more Dependents	0.964	0.983	0.968
	(0.0727)	(0.0743)	(0.0748)
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	1.012	0.988	0.893
	(0.254)	(0.249)	(0.227)
AFQT Score 50-64	0.982	1.060	0.940
	(0.247)	(0.268)	(0.240)
AFQT Score 65-92	1.010	1.187	1.073
	(0.253)	(0.299)	(0.273)
AFQT Score 93-100	1.140	1.434	1.278
	(0.296)	(0.375)	(0.337)
Any AFQT Score (ref group)	1	1	1
Missing AFQT Score	0.988	1.108	0.880
	(0.265)	(0.298)	(0.240)
No Waiver (ref group)	1	1	1
Other Waiver	1.075	1.042	0.998
	(0.0628)	(0.0611)	(0.0603)
Minor Waiver	1.234	1.154	1.116
	(0.196)	(0.183)	(0.182)
Major Waiver	1.453***	1.390***	1.191*
	(0.128)	(0.123)	(0.109)
Service-Specific Factors			
Not Demoted (ref group)		1	1
One year Post-Demotion		1.580***	1.246***
		(0.109)	(0.0892)
Two or more years Post-Demotion		1.568***	1.286***
		(0.127)	(0.108)
Enlisted Apprentice (E1-E4) (ref group)		1	1
Enlisted Journeyman (E5-E6)		0.607***	0.677***
		(0.0355)	(0.0403)
Enlisted Supervisor (E7-E9)		0.395***	0.490***
		(0.0487)	(0.0610)
Administrative Ratings (ref group)		1	1
Air Ratings		1.246***	1.310***
		(0.0850)	(0.0906)
Operations Ratings		1.325***	1.288***
		(0.100)	(0.101)
Construction Ratings		1.047	0.880
		(0.175)	(0.151)
Other Ratings		0.964	0.889
		(0.150)	(0.142)
Supply Ratings		1.503***	1.490***
		(0.119)	(0.122)

Table 20 (cont'd). Suicide Attempt: Active Duty Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Intelligence Ratings		1.091	1.086
		(0.0759)	(0.0774)
Engineering Ratings		1.118	1.106
		(0.0784)	(0.0791)
Weapons Ratings		1.210**	1.137
		(0.0980)	(0.0947)
Medical Ratings		1.730***	1.303***
		(0.127)	(0.100)
Undesignated Ratings		0.973	1.040
		(0.0525)	(0.0568)
Unknown Ratings		1.333**	1.236*
		(0.151)	(0.145)
Not Deployed to Combat Zone (ref group)		1	1
Deployed to Combat Zone		0.823***	0.883***
		(0.0375)	(0.0413)
Shore Facilities (ref group)		1	1
Small Platforms		1.510***	1.398***
		(0.0841)	(0.0798)
Air Platforms		1.255***	1.089
		(0.0840)	(0.0750)
Amphibious Platforms		1.785***	1.704***
		(0.0964)	(0.0945)
Aircraft Carrier Platforms		1.477***	1.550***
		(0.0748)	(0.0800)
Submarine Platforms		1.446***	1.330***
		(0.129)	(0.121)
Other Sea Platforms		1.359***	1.330**
		(0.150)	(0.151)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

3. Yearly Observations Logit Regression Results for Suicide Death

Table 21 contains the logit regression results for the active duty enlisted sample of yearly observations for the outcome of a suicide death. Enlisted active duty personnel who had a previous diagnosis of a suicide attempt are 5.5 times more likely to commit suicide than individuals who did not have a prior suicide attempt diagnosis. This result indicates individuals who previously attempted suicide are at a higher risk for dying by suicide, which is consistent with previous research as reported by RAND (Ramchand et al., 2011). As compared with suicide attempts, a diagnosis of PTSD is no longer a statistically significant risk factor when analyzing the death by suicide outcome variable.

However, active enlisted persons that have ever been diagnosed with depression or substance abuse are 3.4 and 2.5 times, respectively, more likely to die by suicide. This is substantiates earlier findings that these conditions are associated with higher odds of attempting suicide.

Consistent with previous research regarding demographic findings, on average, males are 4 times more likely than females to die by suicide; African Americans, Hispanics, and unknown races are at least 40% less likely to commit suicide than whites; active enlisted sailors who previously divorced are 56% less likely to die by suicide than someone not previously divorced; and AFQT scores are not statistically significant (Lien et al., 2013a; Lien et al., 2013b). Contrary to previous research concerning active duty enlisted sailors, the number of dependents and various accession waivers were not statistically significant. Incidentally, sailors had higher odds of dying by suicide in CY2003 and 2004 and 56% lower odds in 2011 than CY2002 (reference group).

Several service-specific factors were statistically significant in the yearly dataset of active duty enlisted. Those sailors ever previously demoted were 2.3 times more likely to commit suicide than those never demoted. Research indicates sailors who encounter administrative problems like demotion are at a higher risk for suicide (Lien et al., 2013a). Also consistent with previous findings, all paygrades greater than E4 are 50–60% less likely to die by suicide than junior enlisted personnel (E1-E4). No enlisted ratings were statistically significant when controlling for demographics, service-specific factors, and mental health conditions. Those sailors who were deployed to a combat zone at some point in their career were found to have 47% lower odds of dying by suicide than those who were never deployed to a combat zone. On average, when controlling for demographics, service-specific factors, and mental health diagnoses, personnel attached to aircraft carriers and small ships (minesweepers, frigates, destroyers, and cruisers) were 32% and 24%, respectively, less likely to die by suicide. These results are contradictory to Golliday’s analysis that did not find any specific platform statistically significant.

Table 21. Suicide Death: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Death	Suicide Death	Suicide Death
Observations	2,419,896	2,419,896	2,419,896
Constant	0.000169***	0.000267***	0.000212***
	(7.27e-05)	(0.000119)	(9.55e-05)
Mental Health Diagnoses			
No Diagnosis of Suicide Attempt in Current Calendar Year (ref group)			1
Diagnosed with Suicide Attempt or Death in Current Calendar Year			1.912
			(0.804)
No Diagnosis of Suicide Attempt (ref group)			1
Previous Diagnosis of Suicide Attempt or Death			5.541***
			(2.243)
No Diagnosis of PTSD (ref group)			1
Previous Diagnosis of PTSD			1.497
			(0.397)
No Diagnosis of Depression (ref group)			1
Previous Diagnosis of Depression			3.373***
			(0.633)
No Diagnosis of Substance Use (ref group)			1
Previous Diagnosis of Substance Use			2.492***
			(0.550)
Demographics			
Female (ref group)	1	1	1
Male	3.480***	3.501***	3.947***
	(0.636)	(0.644)	(0.737)
Age 17-21 (ref group)	1	1	1
Age 22-24	0.913	1.047	1.023
	(0.100)	(0.123)	(0.120)
Age 25-29	0.694***	0.992	0.958
	(0.0869)	(0.137)	(0.132)
Age 30-34	0.609***	1.093	1.061
	(0.0972)	(0.202)	(0.197)
Age 35-39	0.524***	1.060	1.015
	(0.0881)	(0.213)	(0.204)
Age 40+	0.600***	1.276	1.208
	(0.108)	(0.279)	(0.264)
White (ref group)	1	1	1
Black	0.538***	0.517***	0.544***
	(0.0660)	(0.0633)	(0.0668)
Other Minority	0.819	0.787*	0.815
	(0.104)	(0.101)	(0.104)
Unknown Race	0.431**	0.418**	0.431**
	(0.179)	(0.175)	(0.180)
Hispanic	0.608***	0.591***	0.601***
	(0.0895)	(0.0874)	(0.0890)
Never Married (ref group)	1	1	1
Married	0.699**	0.752*	0.760*
	(0.119)	(0.126)	(0.124)

Table 21 (cont'd). Suicide Death: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Not Previously Divorced (ref group)	1	1	1
Previously Divorced	0.400***	0.422***	0.436***
	(0.0350)	(0.0366)	(0.0379)
No Dependents (ref group)	1	1	1
One Dependent	1.079	1.081	1.054
	(0.183)	(0.182)	(0.175)
Two or more Dependents	0.819	0.875	0.860
	(0.160)	(0.170)	(0.165)
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	1.110	1.084	1.095
	(0.407)	(0.399)	(0.403)
AFQT Score 50-64	1.166	1.168	1.162
	(0.429)	(0.430)	(0.428)
AFQT Score 65-92	1.099	1.160	1.149
	(0.403)	(0.426)	(0.423)
AFQT Score 93-100	1.376	1.455	1.418
	(0.529)	(0.564)	(0.550)
Any AFQT Score (ref group)	1	1	1
Missing AFQT Score	1.477	1.447	1.416
	(0.576)	(0.566)	(0.555)
No Waiver (ref group)	1	1	1
Other Waiver	1.160	1.145	1.123
	(0.133)	(0.133)	(0.131)
Minor Waiver	0.640	0.579	0.570
	(0.288)	(0.261)	(0.257)
Major Waiver	1.153	1.100	1.078
	(0.195)	(0.187)	(0.183)
Service-Specific Factors			
Not Previously Demoted (ref group)		1	1
Previously Demoted		2.665***	2.278***
		(0.351)	(0.313)
Enlisted Apprentice (E1-E4) (ref group)		1	1
Enlisted Journeyman (E5-E6)		0.458***	0.491***
		(0.0553)	(0.0597)
Enlisted Supervisor (E7-E9)		0.346***	0.386***
		(0.0689)	(0.0768)
Administrative Ratings (ref group)		1	1
Air Ratings		0.743*	0.776*
		(0.114)	(0.119)
Operations Ratings		0.825	0.828
		(0.148)	(0.148)
Construction Ratings		0.779	0.797
		(0.220)	(0.225)
Other Ratings		1.022	1.060
		(0.255)	(0.265)
Supply Ratings		0.924	0.932
		(0.187)	(0.189)
Intelligence Ratings		0.722**	0.743*
		(0.115)	(0.118)

Table 21 (cont'd). Suicide Death: Active Duty Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Engineering Ratings		0.844	0.866
		(0.132)	(0.135)
Weapons Ratings		0.913	0.932
		(0.163)	(0.166)
Medical Ratings		0.762	0.721*
		(0.143)	(0.137)
Undesignated Ratings		0.767*	0.822
		(0.107)	(0.114)
Unknown Ratings		0.359*	0.364*
		(0.208)	(0.212)
Not Deployed to Combat Zone (ref group)		1	1
Deployed to Combat Zone		0.495***	0.528***
		(0.0704)	(0.0753)
Not Previously Deployed to Combat Zone (ref group)		1	1
Prior Deployment to Combat Zone		1.227*	1.201*
		(0.131)	(0.128)
Shore Facilities (ref group)		1	1
Small Platforms		0.674***	0.678***
		(0.101)	(0.102)
Air Platforms		0.948	0.932
		(0.166)	(0.163)
Amphibious Platforms		1.205	1.192
		(0.171)	(0.170)
Aircraft Carrier Platforms		0.743**	0.759**
		(0.102)	(0.105)
Submarine Platforms		0.751	0.783
		(0.142)	(0.148)
Other Sea Platforms		0.431*	0.437*
		(0.194)	(0.197)
Year Cohorts			
CY2002 (ref group)	1	1	1
CY2003	1.612***	1.521***	1.516***
	(0.259)	(0.245)	(0.245)
CY2004	1.814***	1.551***	1.542***
	(0.289)	(0.250)	(0.249)
CY2005	1.524**	1.275	1.247
	(0.254)	(0.219)	(0.214)
CY2006	1.517**	1.277	1.225
	(0.258)	(0.221)	(0.213)
CY2007	1.174	0.993	0.949
	(0.215)	(0.185)	(0.177)
CY2008	1.322	1.086	1.037
	(0.234)	(0.198)	(0.189)
CY2009	0.955	0.771	0.738
	(0.184)	(0.151)	(0.144)
CY2010	0.894	0.712*	0.689*
	(0.174)	(0.142)	(0.137)
CY2011	0.564***	0.450***	0.442***
	(0.124)	(0.0986)	(0.0968)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

4. Aggregated Logit Regression Results for Suicide Death

Table 22 contains the logit regression results for the active duty enlisted sample of aggregated observations (one observation per sailor) for the outcome of a suicide death. Previous mental health diagnoses in the aggregated sample regression results were consistent with the yearly results and continue to demonstrate that being diagnosed with these mental health conditions increase the odds of dying by suicide.

Minor differences in the aggregated demographic results were revealed. Active enlisted sailors who were 40 years old and above became statistically significant and had 51% lower odds of dying by suicide than those ages 17–21. The unknown race category became statistically insignificant while other minorities were statistically significant and 30% less susceptible to death by suicide than whites.

The service-specific factors enlisted supervisors, one- and two-year post demotion variables, and all platforms become statistically insignificant in the aggregated results compared to the yearly sample. Sailors with an undesignated rating become significant and are associated with a 44% lower risk of dying by suicide than those assigned to administrative ratings.

Table 22. Suicide Death: Active Duty Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Death	Suicide Death	Suicide Death
Observations	485,956	485,956	485,956
Constant	0.000867***	0.00125***	0.00104***
	(0.000360)	(0.000539)	(0.000450)
Mental Health Diagnoses			
No Diagnosis of Suicide Attempt (ref group)			1
Diagnosis of Suicide Attempt or Death			6.313***
			(1.173)
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			1.024
			(0.257)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			2.300***
			(0.348)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			1.672***
			(0.300)
Demographics			
Female (ref group)	1	1	1
Male	3.906***	3.996***	4.397***
	(0.711)	(0.731)	(0.808)
Age 17-21 (ref group)	1	1	1
Age 22-24	0.942	0.997	0.994
	(0.105)	(0.113)	(0.113)
Age 25-29	0.714***	0.827	0.832
	(0.0880)	(0.113)	(0.114)
Age 30-34	0.872	1.045	1.060
	(0.132)	(0.185)	(0.187)
Age 35-39	0.573***	0.699*	0.713*
	(0.0977)	(0.143)	(0.146)
Age 40+	0.398***	0.476***	0.491***
	(0.0739)	(0.107)	(0.111)
White (ref group)	1	1	1
Black	0.531***	0.533***	0.554***
	(0.0634)	(0.0644)	(0.0670)
Other Minority	0.659***	0.678***	0.696***
	(0.0831)	(0.0859)	(0.0884)
Unknown Race	1.169	1.140	1.153
	(0.241)	(0.236)	(0.239)
Hispanic	0.523***	0.533***	0.542***
	(0.0748)	(0.0765)	(0.0778)
Never Married (ref group)	1	1	1
Married	1.065	1.034	1.019
	(0.198)	(0.189)	(0.186)

Table 22 (cont'd). Suicide Death: Active Duty Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Divorced/Separated/Widowed	0.635***	0.712***	0.717***
	(0.0727)	(0.0822)	(0.0831)
No Dependents (ref group)	1	1	1
One Dependent	0.936	0.930	0.920
	(0.167)	(0.164)	(0.161)
Two or more Dependents	0.778	0.800	0.793
	(0.152)	(0.155)	(0.153)
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	0.924	0.946	0.945
	(0.343)	(0.353)	(0.352)
AFQT Score 50-64	0.859	0.881	0.877
	(0.321)	(0.330)	(0.329)
AFQT Score 65-92	0.832	0.885	0.872
	(0.308)	(0.330)	(0.326)
AFQT Score 93-100	0.979	1.057	1.026
	(0.382)	(0.417)	(0.404)
Any AFQT Score (ref group)	1	1	1
Missing AFQT Score	1.563	1.499	1.461
	(0.615)	(0.592)	(0.578)
No Waiver (ref group)	1	1	1
Other Waiver	1.160	1.118	1.107
	(0.133)	(0.128)	(0.127)
Minor Waiver	0.588	0.559	0.552
	(0.265)	(0.252)	(0.249)
Major Waiver	1.319	1.253	1.213
	(0.223)	(0.213)	(0.206)
Service-Specific Factors			
Not Demoted (ref group)		1	1
One year Post-Demotion		1.332*	1.259
		(0.199)	(0.188)
Two or more years Post-Demotion		0.904	0.862
		(0.199)	(0.190)
Enlisted Apprentice (E1-E4) (ref group)		1	1
Enlisted Journeyman (E5-E6)		0.723***	0.750**
		(0.0857)	(0.0888)
Enlisted Supervisor (E7-E9)		0.687**	0.724*
		(0.121)	(0.127)
Administrative Ratings (ref group)		1	1
Air Ratings		0.767*	0.767*
		(0.112)	(0.112)
Operations Ratings		0.990	0.974
		(0.167)	(0.164)
Construction Ratings		1.083	1.059
		(0.284)	(0.278)

Table 22 (cont'd). Suicide Death: Active Duty Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Other Ratings		1.337	1.327
		(0.306)	(0.304)
Supply Ratings		1.146	1.122
		(0.216)	(0.211)
Intelligence Ratings		0.919	0.910
		(0.137)	(0.136)
Engineering Ratings		0.779*	0.778*
		(0.115)	(0.114)
Weapons Ratings		1.155	1.141
		(0.189)	(0.187)
Medical Ratings		1.021	0.954
		(0.175)	(0.164)
Undesignated Ratings		0.554***	0.561***
		(0.0650)	(0.0656)
Unknown Ratings		0.736	0.724
		(0.202)	(0.199)
Not Deployed to Combat Zone (ref group)		1	1
Deployed to Combat Zone		0.807**	0.821**
		(0.0771)	(0.0786)
Shore Facilities (ref group)		1	1
Small Platforms		0.904	0.879
		(0.112)	(0.109)
Air Platforms		1.007	0.977
		(0.146)	(0.141)
Amphibious Platforms		1.210	1.166
		(0.151)	(0.145)
Aircraft Carrier Platforms		0.875	0.864
		(0.103)	(0.102)
Submarine Platforms		0.995	0.963
		(0.162)	(0.157)
Other Sea Platforms		0.899	0.881
		(0.231)	(0.227)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

B. RESERVE COMPONENT ENLISTED

1. Yearly Observations Logit Regression Results for Suicide Attempt

Table 23 contains the logit regression results for the reserve component enlisted sample of yearly observations for the outcome of a current suicide attempt. Mental health conditions continue to be statistically significant risk factors associated with suicide attempts. Unlike the active duty sample, only two (depression and substance use) out of three mental health diagnoses are statistically significant indicators of increased odds for attempting suicide. Personnel who were ever diagnosed with depression or substance use were 8.6 and 9.8 times, respectively, more likely to commit a suicide attempt than those who were never diagnosed with the like.

The following demographic results were consistent with the enlisted active duty personnel results and previous research. On average, enlisted reserve males were 56% less likely to attempt suicide than females; those previously divorced were 19% less susceptible for attempting suicide; and married enlisted reservists were 1.3 times more likely to attempt suicide when compared to the applicable reference groups. Analysis of the reserve sample found enlisted sailors older than 24 years of age to be greater than 36% less likely to attempt suicide than enlisted reserve personnel ages 17–21. Additionally, race/ethnicity categories, AFQT scores, accession waivers, and all but one CY were statistically insignificant. In CY2010, enlisted reservists were 1.6 times more likely to commit a suicide attempt than in 2002.

Few service-specific factors were statistically significant in the enlisted reserve yearly sample. Personnel previously demoted were 1.7 times more likely to attempt suicide than those never demoted; individuals who were ever deployed to a combat zone were 42% less susceptible to suicide attempts than those never deployed; those attached to large platforms were 1.2 times more likely to attempt suicide. These results are generally consistent with the active duty sample.

Table 23. Suicide Attempt: Reserve Component Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Current Attempt	Current Attempt	Current Attempt
Observations	798,902	798,902	798,902
Constant	0.00105***	0.000860***	0.000600***
	(0.000269)	(0.000273)	(0.000193)
Mental Health Diagnoses			
No Diagnosis of PTSD (ref group)			1
Previous Diagnosis of PTSD			1.255
			(0.243)
No Diagnosis of Depression (ref group)			1
Previous Diagnosis of Depression			8.635***
			(1.201)
No Diagnosis of Substance Use (ref group)			1
Previous Diagnosis of Substance Use			9.833***
			(1.532)
Demographics			
Female (ref group)	1	1	1
Male	0.364***	0.371***	0.443***
	(0.0333)	(0.0358)	(0.0439)
Age 17-21 (ref group)	1	1	1
Age 22-24	0.895	0.893	0.879
	(0.0913)	(0.0972)	(0.0964)
Age 25-29	0.659***	0.697**	0.636***
	(0.0899)	(0.102)	(0.0940)
Age 30-34	0.584**	0.653*	0.555**
	(0.130)	(0.151)	(0.129)
Age 35 or more	0.430**	0.510*	0.421**
	(0.153)	(0.182)	(0.148)
White (ref group)	1	1	1
Black	1.016	0.970	1.061
	(0.123)	(0.118)	(0.130)
Other Minority	0.880	0.870	0.948
	(0.128)	(0.127)	(0.140)
Unknown Race	1.106	1.091	1.171
	(0.377)	(0.373)	(0.395)
Hispanic	0.909	0.891	0.943
	(0.118)	(0.116)	(0.124)
Never Married (ref group)	1	1	1
Married	1.419**	1.383**	1.324**
	(0.208)	(0.203)	(0.188)
Never Divorced (ref group)	1	1	1
Previously Divorced	0.853	0.863	0.809**
	(0.0924)	(0.0941)	(0.0863)
No Dependents (ref group)	1	1	1
One Dependent	1.078	1.079	1.069
	(0.156)	(0.155)	(0.150)
Two or more Dependents	1.347*	1.367*	1.324*
	(0.229)	(0.231)	(0.225)

Table 23 (cont'd). Suicide Attempt: Reserve Component Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	1.277	1.279	1.294
	(0.291)	(0.293)	(0.301)
AFQT Score 50-64	1.159	1.164	1.150
	(0.268)	(0.269)	(0.269)
AFQT Score 65-92	1.138	1.123	1.095
	(0.257)	(0.253)	(0.249)
AFQT Score 93-100	1.330	1.348	1.302
	(0.379)	(0.387)	(0.378)
No Waiver (ref group)	1	1	1
Other Waiver	1.045	1.039	0.937
	(0.149)	(0.148)	(0.136)
Minor Waiver	0.932	0.919	0.769
	(0.383)	(0.378)	(0.318)
Major Waiver	0.969	0.967	0.860
	(0.236)	(0.235)	(0.218)
Service-Specific Factors			
Not Previously Demoted (ref group)		1	1
Previously Demoted		2.095***	1.731***
		(0.331)	(0.290)
Mid-level and Senior Enlisted (E5-E9) (ref group)		1	1
Junior Enlisted (E1-E4)		1.321**	1.254*
		(0.166)	(0.159)
Administrative Ratings (ref group)[1]		1	1
Air Ratings		1.105	1.137
		(0.216)	(0.228)
Operations Ratings		1.098	1.092
		(0.243)	(0.248)
Construction Ratings		0.880	0.864
		(0.361)	(0.357)
Other Ratings		0.597	0.554
		(0.259)	(0.239)
Supply Ratings		1.343	1.335
		(0.305)	(0.308)
Intelligence Ratings		1.407*	1.424*
		(0.285)	(0.298)
Engineering Ratings		0.843	0.844
		(0.182)	(0.186)
Weapons Ratings		0.918	0.920
		(0.222)	(0.224)
Medical Ratings		1.088	0.836
		(0.245)	(0.199)
Undesignated Ratings		0.715*	0.697*
		(0.130)	(0.129)
Not Deployed to Combat Zone (ref group)		1	1
Deployed to Combat Zone		0.577***	0.582***
		(0.0843)	(0.0857)

Table 23 (cont'd). Suicide Attempt: Reserve Component Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Not Previously Deployed to Combat Zone (ref group)		1	1
Previously Deployed to Combat Zone		0.952	0.974
		(0.113)	(0.117)
Shore Facilities (ref group)[2]		1	1
Small Platforms		1.251	1.269*
		(0.177)	(0.183)
Large Platforms		1.144	1.242**
		(0.122)	(0.134)
Air Platforms		0.855	0.821
		(0.185)	(0.179)
Submarine Platforms		1.000	0.968
		(0.275)	(0.266)
Year Cohorts			
CY2002 (ref group)	1	1	1
CY2003	0.884	0.871	0.870
	(0.175)	(0.172)	(0.172)
CY2004	0.883	0.816	0.810
	(0.174)	(0.163)	(0.163)
CY2005	1.222	1.130	1.125
	(0.230)	(0.214)	(0.214)
CY2006	1.013	0.954	0.938
	(0.202)	(0.193)	(0.190)
CY2007	1.454**	1.385*	1.350
	(0.269)	(0.262)	(0.257)
CY2008	1.230	1.156	1.117
	(0.243)	(0.233)	(0.226)
CY2009	1.539**	1.433*	1.413*
	(0.295)	(0.280)	(0.278)
CY2010	1.767***	1.623**	1.633**
	(0.345)	(0.323)	(0.329)
CY2011	1.212	1.115	1.165
	(0.279)	(0.264)	(0.279)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

2. Aggregated Logit Regression Results for Suicide Attempt

Table 24 contains the logit regression results for the reserve component enlisted sample of aggregated observations (one observation per sailor) for the outcome of a suicide attempt. The aggregated results report enlisted reservists who ever received a PTSD diagnosis were 1.7 times more likely to attempt suicide. As in the yearly reserve and active duty results, depression and substance use continue to be statistically significant with higher odds of attempting suicide. Additionally, females continue to show higher odds of suicide attempts, such that they are 48% more likely to attempt suicide than males. No other demographic characteristics were statistically significant in the aggregated sample.

The aggregated sample logistic regression results revealed several differences in service-specific factors. Demotion within one year of the change in status was not statistically significant, but those demoted within two or more years were 1.4 times more likely to attempt suicide. Junior enlisted reserve sailors (E1-E4) were 1.5 times more likely to attempt suicide than those senior to them. The air, intelligence and undesignated ratings were 1.5, 1.4 and 1.3 times, respectively, more susceptible to suicide attempts than those with an administrative rating. Personnel attached to small and large platforms became statistically significant in the aggregated sample and were associated with 1.4 higher odds of attempting suicide. This relationship between assignment to surface platforms and increased odds of suicide attempts is also seen in the active duty enlisted results.

Table 24. Suicide Attempt: Reserve Component Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Attempt	Suicide Attempt	Suicide Attempt
Observations	181,369	181,369	181,369
Constant	0.00432***	0.00183***	0.00143***
	(0.00102)	(0.000568)	(0.000450)
Mental Health Diagnoses			
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			1.670***
			(0.275)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			9.112***
			(1.028)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			10.67***
			(1.373)
Demographics			
Female (ref group)	1	1	1
Male	0.403***	0.406***	0.484***
	(0.0354)	(0.0373)	(0.0459)
Age 17-21 (ref group)	1	1	1
Age 22-24	0.884	0.909	0.865
	(0.115)	(0.119)	(0.115)
Age 25-29	0.839	0.898	0.786
	(0.120)	(0.131)	(0.116)
Age 30-34	0.807	0.915	0.744
	(0.159)	(0.183)	(0.152)
Age 35 or more	0.771	0.970	0.699
	(0.203)	(0.260)	(0.193)
White (ref group)	1	1	1
Black	1.090	1.020	1.133
	(0.123)	(0.116)	(0.131)
Other Minority	1.069	0.999	1.074
	(0.141)	(0.132)	(0.144)
Unknown Race	0.865	0.919	0.987
	(0.202)	(0.214)	(0.232)
Hispanic	0.984	0.938	0.981
	(0.116)	(0.111)	(0.118)
Never Married (ref group)	1	1	1
Married	1.336*	1.478**	1.335*
	(0.216)	(0.245)	(0.225)
Divorced/Separated/Widowed	0.982	0.846	0.848
	(0.126)	(0.113)	(0.116)
No Dependents (ref group)	1	1	1
One Dependent	1.070	1.053	1.043
	(0.141)	(0.139)	(0.139)
Two or more Dependents	1.338*	1.315*	1.307*
	(0.199)	(0.197)	(0.199)

Table 24 (cont'd). Suicide Attempt: Reserve Component Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	1.410	1.219	1.246
	(0.299)	(0.261)	(0.270)
AFQT Score 50-64	1.292	1.154	1.153
	(0.277)	(0.249)	(0.252)
AFQT Score 65-92	1.263	1.116	1.124
	(0.267)	(0.238)	(0.243)
AFQT Score 93-100	1.405	1.222	1.232
	(0.387)	(0.343)	(0.351)
No Waiver (ref group)	1	1	1
Other Waiver	1.028	1.065	0.994
	(0.134)	(0.139)	(0.133)
Minor Waiver	1.027	0.998	0.857
	(0.392)	(0.381)	(0.338)
Major Waiver	1.061	1.108	1.021
	(0.220)	(0.230)	(0.217)
Service-Specific Factors			
Never Demoted (ref group)		1	1
One year Post-Demotion		1.120	1.074
		(0.214)	(0.208)
Two of more years Post-Demotion		1.755***	1.386**
		(0.266)	(0.218)
Mid-level and Senior Enlisted (E5-E9) (ref group)		1	1
Junior Enlisted (E1 to E4)		1.681***	1.512**
		(0.330)	(0.300)
Administrative Ratings (ref group)[1]		1	1
Air Ratings		1.548***	1.551***
		(0.219)	(0.223)
Operations Ratings		1.133	1.126
		(0.189)	(0.191)
Construction Ratings		1.024	0.954
		(0.382)	(0.362)
Other Ratings		0.600	0.509*
		(0.232)	(0.201)
Supply Ratings		1.333*	1.318
		(0.227)	(0.230)
Intelligence Ratings		1.392**	1.416**
		(0.218)	(0.228)
Engineering Ratings		1.091	1.059
		(0.173)	(0.171)
Weapons Ratings		0.936	0.928
		(0.179)	(0.180)
Medical Ratings		1.385*	1.072
		(0.235)	(0.189)
Undesignated Ratings		1.423***	1.338***
		(0.153)	(0.146)

Table 24 (cont'd). Suicide Attempt: Reserve Component Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Not Deployed to Combat Zone (ref group)		1	1
Deployed to Combat Zone		0.767***	0.811**
		(0.0701)	(0.0757)
Shore Facilities (ref group)[2]		1	1
Small Platforms		1.372***	1.368***
		(0.163)	(0.166)
Large Platforms		1.295***	1.353***
		(0.130)	(0.137)
Air Platforms		1.170	1.103
		(0.163)	(0.156)
Submarine Platforms		1.308	1.150
		(0.306)	(0.274)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.
Notes:
1. Administrative Rating category includes unknown ratings.
2. Shore Facilities category includes unknown platforms.

3. Yearly Observations Logit Regression Results for Suicide Death

Table 25 contains the logit regression results for the reserve component enlisted sample of yearly observations for the outcome of suicide death. Enlisted reserve sailors were 5 and 7.1 times more likely to die by suicide if they were previously diagnosed with depression and substance use, respectively. Those individuals ever receiving a diagnosis of a previous suicide attempt was not statistically significant.

Enlisted reserve males were 3.5 times more likely to commit suicide than females, which is consistent with prior literature. Different from most regression results thus far, on average, the ages 22–24, 25–29, and 30–34 were 4.5, 3.4, and 2.9 times, respectively, more likely to die by suicide than ages 17–21. Race and ethnicity categories were statistically insignificant. Those previously divorced were 48% less susceptible to death by suicide than those who have not divorced. Also contrary to previous results, enlisted reservists with one dependent were 61% less likely to die by suicide than individuals with no dependents. Different from all other sample, those personnel who obtained other waivers or major waivers were 1.7 and 2.5 times more susceptible to die by suicide than individuals who did not obtain a waiver. Additionally, in CY2011, enlisted reservists were 62% less likely to commit suicide than in CY2002.

Service-specific factors that were statistically significant and were associated with lower odds of dying by suicide include personnel who were ever previously demoted and those with engineering ratings. Those previously deployed to combat zone were 1.9 times more likely to die by suicide. No platforms were statistically significant at or below the 95% level.

Table 25. Suicide Death: Reserve Component Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Death	Suicide Death	Suicide Death
Observations	799,899	799,899	799,899
Constant	2.32e-05***	4.75e-05***	4.41e-05***
	(1.24e-05)	(2.91e-05)	(2.70e-05)
Mental Health Diagnoses			
No Previous Diagnosis of Suicide Attempt (ref group)			1
Previous Diagnosis of Suicide Attempt or Death			1.304
			(1.378)
No Previous Diagnosis of PTSD (ref group)			1
Previous Diagnosis of PTSD			0.266
			(0.279)
No Previous Diagnosis of Depression (ref group)			1
Previous Diagnosis of Depression			4.980***
			(2.110)
No Previous Diagnosis of Substance Use (ref group)			1
Previous Diagnosis of Substance Use			7.124***
			(3.070)
Demographics			
Female (ref group)	1	1	1
Male	3.033***	3.254***	3.497***
	(1.089)	(1.182)	(1.281)
Age 17-21 (ref group)	1	1	1
Age 22-24	6.035***	4.705***	4.528***
	(1.810)	(1.485)	(1.434)
Age 25-29	4.853***	3.563***	3.368***
	(1.658)	(1.294)	(1.225)
Age 30-34	4.427***	3.104**	2.907**
	(1.948)	(1.472)	(1.381)
Age 35 or more	3.241*	2.212	2.016
	(2.036)	(1.454)	(1.329)
White (ref group)	1	1	1
Black	0.639	0.565**	0.587*
	(0.181)	(0.160)	(0.166)
Other Minority	0.760	0.745	0.769
	(0.228)	(0.226)	(0.233)
Unknown Race	1.827	1.691	1.732
	(0.828)	(0.769)	(0.789)
Hispanic	0.669	0.627	0.639
	(0.195)	(0.183)	(0.189)
Never Married (ref group)	1	1	1
Married	1.214	1.181	1.174
	(0.419)	(0.402)	(0.390)
Not Previously Divorced (ref group)	1	1	1
Previously Divorced	0.528***	0.524***	0.522***
	(0.0880)	(0.0892)	(0.0891)

Table 25 (cont'd). Suicide Death: Reserve Component Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
No Dependents (ref group)	1	1	1
One Dependent	0.387**	0.388**	0.386**
	(0.160)	(0.159)	(0.157)
Two or more Dependents	0.972	0.986	0.982
	(0.413)	(0.412)	(0.404)
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	0.667	0.641	0.637
	(0.219)	(0.212)	(0.211)
AFQT Score 50-64	0.730	0.724	0.717
	(0.237)	(0.233)	(0.231)
AFQT Score 65-92	0.621	0.671	0.665
	(0.190)	(0.203)	(0.201)
AFQT Score 93-100	0.675	0.857	0.844
	(0.286)	(0.359)	(0.354)
No Waiver (ref group)	1	1	1
Other Waiver	1.710**	1.688**	1.669**
	(0.386)	(0.384)	(0.379)
Minor Waiver	1.585	1.538	1.529
	(0.932)	(0.902)	(0.900)
Major Waiver	2.624***	2.557***	2.547***
	(0.709)	(0.681)	(0.679)
Service-Specific Factors			
Not Previously Demoted (ref group)		1	1
Previously Demoted		2.368***	2.143***
		(0.616)	(0.564)
Mid-level and Senior Enlisted (E5-E9) (ref group)		1	1
Junior Enlisted (E1 to E4)		0.869	0.844
		(0.180)	(0.175)
Administrative Ratings (ref group)[1]		1	1
Air Ratings		0.566*	0.579*
		(0.184)	(0.187)
Operations Ratings		0.805	0.798
		(0.302)	(0.300)
Construction Ratings		0.643	0.663
		(0.421)	(0.433)
Other Ratings		0.369	0.360
		(0.278)	(0.273)
Supply Ratings		0.979	0.983
		(0.397)	(0.401)
Intelligence Ratings		0.660	0.657
		(0.249)	(0.248)
Engineering Ratings		0.462**	0.460**
		(0.167)	(0.167)
Weapons Ratings		0.448*	0.449*
		(0.205)	(0.206)
Medical Ratings		1.117	1.116
		(0.403)	(0.413)

Table 25 (cont'd). Suicide Death: Reserve Component Enlisted Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Undesignated Ratings		0.463*	0.479*
		(0.199)	(0.208)
Not Deployed to Combat Zone (ref group)		1	1
Deployed to combat zone		0.686*	0.691
		(0.156)	(0.159)
Not Previously Deployed to Combat Zone (ref group)		1	1
Previously Deployed to Combat Zone		1.879***	1.897***
		(0.415)	(0.419)
Shore Facilities (ref group)[2]		1	1
Small Platforms		0.975	0.983
		(0.271)	(0.273)
Large Platforms		1.153	1.186
		(0.233)	(0.240)
Air Platforms		0.830	0.819
		(0.352)	(0.347)
Submarine Platforms		0.151*	0.153*
		(0.152)	(0.154)
Constant	2.32e-05***	4.75e-05***	4.41e-05***
	(1.24e-05)	(2.91e-05)	(2.70e-05)
Observations	799,899	799,899	799,899
Year Cohorts			
CY2002 (ref group)	1	1	1
CY2003	1.403	1.216	1.195
	(0.491)	(0.430)	(0.422)
CY2004	1.897*	1.485	1.458
	(0.632)	(0.508)	(0.500)
CY2005	1.237	0.947	0.936
	(0.459)	(0.362)	(0.357)
CY2006	1.393	1.029	1.012
	(0.526)	(0.391)	(0.385)
CY2007	1.502	1.072	1.048
	(0.562)	(0.423)	(0.414)
CY2008	1.545	1.076	1.030
	(0.590)	(0.431)	(0.413)
CY2009	1.189	0.811	0.764
	(0.498)	(0.348)	(0.327)
CY2010	1.217	0.822	0.768
	(0.524)	(0.358)	(0.337)
CY2011	0.465	0.298*	0.278**
	(0.296)	(0.194)	(0.181)

Variable coefficients are odds rations. Standard errors in parentheses.

*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

Notes:

1. Administrative Rating category includes unknown ratings.

4. Aggregated Logit Regression Results for Suicide Death

Table 26 contains the logit regression results for the reserve component enlisted sample of aggregated observations (one observation per sailor) for the outcome of suicide death. No major differences were noted in the logit regression results between the yearly and aggregated sample. All age categories, demotion variables, ratings and platforms became statistically insignificant. Hispanic enlisted reservists were associated with 43% lower odds of death by suicide than whites.

Table 26. Suicide Death: Reserve Component Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Death	Suicide Death	Suicide Death
Observations	181,369	181,369	181,369
Constant	0.000452***	0.000432***	0.000393***
	(0.000234)	(0.000269)	(0.000246)
Mental Health Diagnoses			
No Diagnosis of Suicide Attempt (ref group)			1
Diagnosis of Suicide Attempt or Death			1.033
			(1.077)
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			0.211
			(0.217)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			3.577***
			(1.356)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			5.380***
			(2.034)
Demographics			
Female (ref group)	1	1	1
Male	3.189***	3.490***	3.683***
	(1.173)	(1.293)	(1.370)
Age 17-21 (ref group)	1	1	1
Age 22-24	1.288	1.280	1.264
	(0.389)	(0.390)	(0.385)
Age 25-29	1.025	0.995	0.965
	(0.342)	(0.336)	(0.326)
Age 30-34	1.041	0.992	0.937
	(0.451)	(0.437)	(0.413)
Age 35 or more	0.703	0.669	0.619
	(0.421)	(0.409)	(0.380)
White (ref group)	1	1	1
Black	0.660	0.609*	0.627*
	(0.184)	(0.171)	(0.177)
Other Minority	0.840	0.823	0.838
	(0.238)	(0.236)	(0.240)
Unknown Race	1.179	1.081	1.112
	(0.487)	(0.451)	(0.463)
Hispanic	0.587*	0.562**	0.567**
	(0.169)	(0.162)	(0.163)
Never Married (ref group)	1	1	1
Married	0.772	0.728	0.709
	(0.345)	(0.321)	(0.310)
Divorced/Separated/Widowed	1.079	1.124	1.118
	(0.335)	(0.349)	(0.346)
No Dependents (ref group)	1	1	1
One Dependent	0.353**	0.359**	0.362**
	(0.155)	(0.156)	(0.156)

Table 26 (cont'd). Suicide Death: Reserve Component Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Two or more Dependents	1.190	1.232	1.256
	(0.491)	(0.502)	(0.508)
AFQT Score 1-30 (ref group)	1	1	1
AFQT Score 31-49	0.584*	0.594	0.601
	(0.188)	(0.194)	(0.197)
AFQT Score 50-64	0.584*	0.581*	0.588
	(0.189)	(0.189)	(0.192)
AFQT Score 65-92	0.559*	0.579*	0.586*
	(0.172)	(0.181)	(0.183)
AFQT Score 93-100	0.706	0.813	0.813
	(0.296)	(0.348)	(0.348)
No Waiver (ref group)	1	1	1
Other Waiver	1.925***	1.889***	1.855***
	(0.430)	(0.425)	(0.418)
Minor Waiver	1.911	1.855	1.836
	(1.123)	(1.091)	(1.081)
Major Waiver	2.934***	2.915***	2.868***
	(0.782)	(0.783)	(0.772)
Service-Specific Factors			
Never Demoted (ref group)		1	1
One year Post-Demotion		1.404	1.357
		(0.450)	(0.435)
Two of more years Post-Demotion		1.007	0.920
		(0.396)	(0.363)
Mid-level and Senior Enlisted (E5-E9) (ref group)		1	1
Junior Enlisted (E1 to E4)		1.053	1.012
		(0.312)	(0.300)
Administrative Ratings (ref group)[1]		1	1
Air Ratings		0.909	0.910
		(0.296)	(0.295)
Operations Ratings		1.144	1.138
		(0.432)	(0.430)
Construction Ratings		0.920	0.919
		(0.590)	(0.588)
Other Ratings		0.523	0.519
		(0.386)	(0.383)
Supply Ratings		1.472	1.460
		(0.583)	(0.578)
Intelligence Ratings		1.263	1.274
		(0.436)	(0.440)
Engineering Ratings		0.773	0.769
		(0.272)	(0.270)
Weapons Ratings		0.754	0.760
		(0.332)	(0.334)
Medical Ratings		1.778	1.771
		(0.643)	(0.642)

Table 26 (cont'd). Suicide Death: Reserve Component Enlisted Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Undesignated Ratings		0.826	0.822
		(0.190)	(0.190)
Not Deployed to Combat Zone (ref group)		1	1
Deployed to Combat Zone		1.118	1.161
		(0.210)	(0.220)
Shore Facilities (ref group)[2]		1	1
Small Platforms		0.844	0.843
		(0.222)	(0.222)
Large Platforms		0.905	0.914
		(0.193)	(0.195)
Air Platforms		0.766	0.751
		(0.273)	(0.268)
Submarine Platforms		0.346*	0.332*
		(0.212)	(0.203)

Variable coefficients are odds rations. Standard errors in parentheses.

*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

Notes:

1. Administrative Rating category includes unknown ratings.
2. Shore Facilities category includes unknown platforms.

C. ACTIVE DUTY OFFICER

1. Yearly Observations Logit Regression Results for Suicide Attempt

Table 27 contains the logit regression results for the active duty officer sample of yearly observations for the outcome of a current suicide attempt. The logit regression for the active officer yearly sample did not yield many statistically significant variables due to the low number of overall suicide behaviors in the officer population. On average, active duty officers who were ever diagnosed with PTSD had 2.3 times higher odds of attempting suicide than officers without the diagnosis. Similarly, officers were 35.5 times more likely, on average, to attempt suicide if they were ever diagnosed with depression compared to if they were not diagnosed. Finally, a previous diagnosis of substance use in active duty officers revealed a 7.4 times higher likelihood of suicide attempts than individuals who did not receive the same diagnosis. Results indicated that officers, on average, were 6.4 times more likely to attempt suicide in CY2010 than 2002. Gender, age categories, race and ethnicity groups, marital status, and number of dependents were not statistically significant.

Results for service-specific factors were also minimal. Officer paygrades, previous deployments to combat zones, and all platforms were statistically insignificant. The intelligence designator was the only designator statistically significant and was associated with 4.3 times higher odds of suicide attempts than administrative.

Table 27. Suicide Attempt: Active Duty Officer Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Outcome	Current Attempt	Current Attempt	Current Attempt
Observations	406,978	406,978	406,978
Constant	0.000206***	0.000196***	6.20e-05***
	(0.000163)	(0.000181)	(5.83e-05)
Mental Health Diagnoses			
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			2.276**
			(0.942)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			35.47***
			(14.34)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			7.365***
			(3.248)
Demographics			
Female (ref group)	1	1	1
Male	0.270***	0.332***	0.576
	(0.0816)	(0.103)	(0.194)
Age 20-29 (ref group)	1	1	1
Age 30-34	0.814	0.909	0.788
	(0.334)	(0.397)	(0.350)
Age 35-39	0.765	0.959	0.714
	(0.320)	(0.418)	(0.330)
Age 40-44	0.745	1.069	0.663
	(0.307)	(0.501)	(0.319)
Age 45 or more	0.421	0.736	0.401
	(0.246)	(0.525)	(0.285)
White (ref group)[1]	1	1	1
Black	1.396	1.093	1.309
	(0.615)	(0.476)	(0.591)
Other Minority	1.664	1.470	1.469
	(0.798)	(0.706)	(0.779)
Hispanic	0.654	0.602	0.669
	(0.472)	(0.435)	(0.493)
Never Married (ref group)	1	1	1
Married	0.896	0.939	1.078
	(0.350)	(0.365)	(0.427)
Not Previously Divorced (ref group)	1	1	1
Previously Divorced	1.400	1.346	1.162
	(0.411)	(0.398)	(0.359)
No Dependents (ref group)	1	1	1
One Dependent	0.526	0.492	0.455
	(0.257)	(0.238)	(0.221)

Table 27 (cont'd). Suicide Attempt: Active Duty Officer Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Two or more Dependents	0.726	0.634	0.564
	(0.318)	(0.279)	(0.255)
Service-Specific Factors			
Junior Officer (O1-O3) (ref group)	1	1	1
Mid-level Officer (O4-O5)		0.550	0.694
		(0.210)	(0.271)
Senior Officer (O6-O10)		0.421	0.819
		(0.357)	(0.685)
Warrant Officer (WO2-WO5)		0.263	0.339
		(0.282)	(0.372)
Administrative Designator (ref group)	1	1	1
Other Designator		0.619	0.350
		(0.510)	(0.292)
Surface Designator		2.047	1.590
		(1.044)	(0.822)
Submarine Designator		1.298	1.437
		(0.885)	(0.952)
Engineering Designator		0.890	0.613
		(0.935)	(0.662)
Aviation Designator		0.653	0.770
		(0.382)	(0.437)
Intelligence Designator		3.965**	4.276**
		(2.388)	(2.579)
Medical Designator		1.437	0.861
		(0.801)	(0.475)
Supply Designator		1.850	1.354
		(1.254)	(0.937)
Not Deployed to Combat Zone (ref group)	1	1	1
Deployed to Combat Zone		0.427	0.465
		(0.241)	(0.265)
Not Previously Deployed to Combat Zone (ref group)	1	1	1
Previously Deployed to Combat Zone		0.797	0.790
		(0.267)	(0.270)
Shore Facilities (ref group)	1	1	1
Small Platforms		0.689	0.806
		(0.318)	(0.377)
Large Platforms		1.467	1.742
		(0.514)	(0.631)
Unknown Platforms		0.406	0.458
		(0.247)	(0.275)
Year Cohorts			
CY2002 (ref group)	1	1	1
CY2003	0.986	1.032	1.057
	(0.985)	(1.032)	(1.057)

Table 27 (cont'd). Suicide Attempt: Active Duty Officer Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
CY2004	1.484	1.512	1.534
	(1.352)	(1.382)	(1.418)
CY2005	2.994	3.107	3.332
	(2.434)	(2.531)	(2.727)
CY2006	2.510	2.687	2.906
	(2.109)	(2.271)	(2.458)
CY2007	3.511	3.892*	4.432*
	(2.817)	(3.168)	(3.612)
CY2008	3.485	3.813	4.481*
	(2.789)	(3.107)	(3.655)
CY2009	3.443	3.769*	4.833*
	(2.747)	(3.028)	(3.907)
CY2010	4.798**	4.621**	6.440**
	(3.711)	(3.582)	(4.992)
CY2011	2.335	2.230	3.293
	(1.978)	(1.974)	(2.966)

Variable coefficients are odds rations. Standard errors in parentheses.

*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

Note:

1. White race/ethnicity category includes unknown race.

2. Aggregated Logit Regression Results for Suicide Attempt

Table 28 contains the logit regression results for the active duty officer sample of aggregated observations (one observation per sailor) for the outcome of a suicide attempt. As in the yearly sample, all diagnosed mental health conditions and the intelligence designator increase the odds of an officer attempting suicide. However, in the aggregated sample, officers older than 39 years old were associated with a lower risk of attempting suicide. All other variables were insignificant.

Table 28. Suicide Attempt: Active Duty Officer Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Outcome	Suicide Attempt	Suicide Attempt	Suicide Attempt
Constant	0.00296***	0.00207***	0.00103***
	(0.000979)	(0.00111)	(0.000588)
Observations	62,998	62,998	62,998
Mental Health Diagnoses			
No Diagnosis of PTSD (ref group)			1
Diagnosis of PTSD			2.550**
			(1.041)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			29.66***
			(9.449)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			8.126***
			(3.195)
Demographics			
Female (ref group)	1	1	1
Male	0.304***	0.355***	0.533*
	(0.0867)	(0.111)	(0.177)
Age 20-29 (ref group)	1	1	1
Age 30-34	0.668	0.762	0.544
	(0.286)	(0.335)	(0.244)
Age 35-39	0.712	0.937	0.659
	(0.310)	(0.447)	(0.326)
Age 40-44	0.471*	0.722	0.340**
	(0.210)	(0.376)	(0.187)
Age 45 or more	0.237***	0.399	0.175**
	(0.120)	(0.265)	(0.120)
White (ref group)[1]	1	1	1
Black	1.392	1.176	1.415
	(0.544)	(0.468)	(0.581)
Other Minority	1.296	1.179	1.357
	(0.612)	(0.560)	(0.659)
Hispanic	0.772	0.715	0.802
	(0.461)	(0.428)	(0.487)
Never Married (ref group)	1	1	1
Married	0.866	0.902	1.011
	(0.379)	(0.394)	(0.460)
Divorced/Separated/Widowed	1.712*	1.752*	1.416
	(0.492)	(0.514)	(0.435)
No Dependents (ref group)	1	1	1
One Dependent	0.940	0.920	0.846
	(0.478)	(0.470)	(0.436)
Two or more Dependents	1.390	1.329	1.245
	(0.652)	(0.628)	(0.614)

Table 28 (cont'd). Suicide Attempt: Active Duty Officer Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Service-Specific Factors			
Junior Officer (O1-O3) (ref group)	1	1	1
Mid-level Officer (O4-O5)		0.576	0.779
		(0.208)	(0.288)
Senior Officer (O6-O10)		0.756	1.387
		(0.567)	(1.046)
Warrant Officer (WO2-WO5)		0.223	0.338
		(0.235)	(0.361)
Administrative Designator (ref group)	1	1	1
Other Designator		1.166	0.868
		(0.653)	(0.509)
Surface Designator		1.957	1.617
		(0.980)	(0.827)
Submarine Designator		1.438	1.435
		(0.907)	(0.891)
Engineering Designator		1.462	1.097
		(1.107)	(0.869)
Aviation Designator		0.874	0.913
		(0.469)	(0.494)
Intelligence Designator		2.570**	2.645**
		(1.195)	(1.248)
Medical Designator		1.548	0.967
		(0.822)	(0.526)
Supply Designator		1.890	1.344
		(1.255)	(0.933)
Not Deployed to Combat Zone (ref group)	1	1	1
Deployed to Combat Zone		0.876	0.972
		(0.254)	(0.290)
Shore Facilities (ref group)	1	1	1
Small Platforms		0.827	0.900
		(0.330)	(0.370)
Large Platforms		1.156	1.173
		(0.373)	(0.389)
Unknown Platforms		0.814	0.876
		(0.270)	(0.304)

Variable coefficients are odds rations. Standard errors in parentheses.

*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

Note:

1. White race/ethnicity category includes unknown race.

3. Yearly Observations Logit Regression Results for Suicide Death

Table 29 contains the logit regression results for the active duty officer sample of yearly observations for the outcome of suicide death. When controlling for demographics, service-specific factors, and mental health diagnoses, officers who had a previous suicide attempt diagnosis were 22.5 times more likely to die by suicide; and a previous diagnosis of depression was associated with 14.2 times higher susceptibility to complete suicide. All other variables were insignificant.

Table 29. Suicide Death: Active Duty Officer Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
	Suicide Death	Suicide Death	Suicide Death
Observations	406,978	406,978	406,978
Constant	0.000103***	0.000228***	0.000162***
	(7.10e-05)	(0.000149)	(0.000106)
Mental Health Diagnoses			
No Diagnosis of Suicide Attempt in Current Calendar Year (ref group)			1
Diagnosed with Suicide Attempt or Death in Current Calendar Year			1.323
			(2.069)
No Diagnosis of Suicide Attempt (ref group)			1
Previous Diagnosis of Suicide Attempt or Death			22.48***
			(26.15)
No Diagnosis of Depression (ref group)			1
Previous Diagnosis of Depression			14.23***
			(8.468)
No Diagnosis of Substance Use (ref group)			1
Previous Diagnosis of Substance Use			3.039
			(2.992)
Demographics			
Female (ref group)	1	1	1
Male	1.604	1.906	2.563
	(0.925)	(1.135)	(1.478)
Age 20-29 (ref group)	1	1	1
Age 30-34	1.369	1.266	1.187
	(0.804)	(0.776)	(0.740)
Age 35-39	0.858	0.751	0.688
	(0.589)	(0.616)	(0.573)
Age 40-44	1.290	1.102	0.939
	(0.820)	(0.937)	(0.823)
Age 45 or more	2.345	2.066	1.706
	(1.390)	(1.735)	(1.478)
White (ref group)[1]	1	1	1
Black	0.934	0.795	0.884
	(0.568)	(0.481)	(0.544)
Other Minority	0.662	0.588	0.548
	(0.666)	(0.600)	(0.597)
Hispanic	1.081	1.026	1.098
	(0.778)	(0.737)	(0.794)
Never Married (ref group)	1	1	1
Married	0.377*	0.393*	0.408
	(0.212)	(0.218)	(0.230)
Not Previously Divorced (ref group)	1	1	1
Previously Divorced	0.691	0.657	0.605
	(0.275)	(0.263)	(0.242)

Table 29 (cont'd). Suicide Death: Active Duty Officer Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
No Dependents (ref group)	1	1	1
One Dependent	1.778	1.713	1.723
	(1.222)	(1.165)	(1.199)
Two or more Dependents	1.132	1.102	1.071
	(0.778)	(0.752)	(0.747)
Service-Specific Factors			
Junior Officer (O1-O3) (ref group)	1	1	1
Mid-level Officer (O4-O5)		0.807	0.870
		(0.456)	(0.484)
Senior Officer (O6-O10)		0.714	0.849
		(0.566)	(0.677)
Warrant Officer (WO2-WO5)		1.367	1.716
		(1.093)	(1.385)
Administrative Designator (ref group)	1	1	1
Other Designator		0.536	0.548
		(0.367)	(0.370)
Surface Designator		0.508	0.451
		(0.309)	(0.277)
Submarine Designator		0.358	0.381
		(0.310)	(0.330)
Engineering Designator		0.399	0.406
		(0.455)	(0.462)
Aviation Designator		0.342*	0.382
		(0.196)	(0.225)
Intelligence Designator		0.462	0.433
		(0.511)	(0.491)
Medical Designator		0.603	0.550
		(0.348)	(0.323)
Supply Designator		0.821	0.832
		(0.595)	(0.592)
Not Deployed to Combat Zone (ref group)	1	1	1
Deployed to Combat Zone		0.402	0.417
		(0.255)	(0.270)
Not Previously Deployed to Combat Zone (ref group)	1	1	1
Previously Deployed to Combat Zone		1.299	1.347
		(0.556)	(0.581)
Shore Facilities (ref group)	1	1	1
Small Platforms		0.502	0.541
		(0.449)	(0.485)
Large Platforms		1.027	1.030
		(0.496)	(0.505)
Unknown Platforms		1.225	1.297
		(0.549)	(0.582)

Table 29 (cont'd). Suicide Death: Active Duty Officer Yearly Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Year Cohorts			
CY2002 (ref group)	1	1	1
CY2003	1.455	1.481	1.440
	(0.852)	(0.872)	(0.850)
CY2004	0.429	0.411	0.387
	(0.362)	(0.340)	(0.313)
CY2005	1.550	1.473	1.352
	(0.907)	(0.884)	(0.829)
CY2006	0.682	0.652	0.579
	(0.501)	(0.496)	(0.444)
CY2007	1.166	1.119	0.952
	(0.741)	(0.759)	(0.648)
CY2008	0.705	0.657	0.531
	(0.510)	(0.501)	(0.419)
CY2009	0.233	0.217	0.178
	(0.253)	(0.232)	(0.192)
CY2010	0.689	0.671	0.530
	(0.495)	(0.494)	(0.405)
CY2011	0.449	0.435	0.354
	(0.375)	(0.378)	(0.302)

Variable coefficients are odds rations. Standard errors in parentheses.
*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.
Note:
1. White race/ethnicity category includes unknown race.

4. Aggregated Logit Regression Results for Suicide Death

Table 30 contains the logit regression results for the active duty officer sample of aggregated observations for the outcome of suicide death. No differences were noted in the logistic regression of the aggregated officer sample.

Table 30. Suicide Death: Active Duty Officer Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Outcome	Suicide Death	Suicide Death	Suicide Death
Observations	62,998	62,998	62,998
Constant	0.000508***	0.00138***	0.000892***
	(0.000316)	(0.00108)	(0.000717)
Mental Health Diagnoses			
No Diagnosis of Suicide Attempt (ref group)			1
Diagnosis of Suicide Attempt or Death			17.59***
			(15.32)
No Diagnosis of Depression (ref group)			1
Diagnosis of Depression			8.562***
			(4.319)
No Diagnosis of Substance Use (ref group)			1
Diagnosis of Substance Use			1.973
			(1.675)
Demographics			
Female (ref group)	1	1	1
Male	1.712	2.172	3.021*
	(0.935)	(1.223)	(1.757)
Age 20-29 (ref group)	1	1	1
Age 30-34	1.741	1.906	1.723
	(0.998)	(1.116)	(1.018)
Age 35-39	1.295	1.418	1.216
	(0.851)	(1.011)	(0.879)
Age 40-44	1.142	1.123	0.942
	(0.711)	(0.826)	(0.701)
Age 45 or more	1.515	1.354	1.123
	(0.867)	(1.032)	(0.867)
White (ref group)[1]	1	1	1
Black	0.859	0.731	0.774
	(0.524)	(0.453)	(0.481)
Other Minority	0.430	0.404	0.406
	(0.437)	(0.412)	(0.416)
Hispanic	0.850	0.813	0.850
	(0.621)	(0.596)	(0.624)
Never Married (ref group)	1	1	1
Married	0.306**	0.348*	0.354*
	(0.171)	(0.190)	(0.192)
Divorced/Separated/Widowed	0.931	1.055	0.993
	(0.355)	(0.406)	(0.383)
No Dependents (ref group)	1	1	1
One Dependent	2.074	1.807	1.917
	(1.391)	(1.204)	(1.268)
Two or more Dependents	1.518	1.376	1.396
	(0.993)	(0.893)	(0.901)

Table 30 (cont'd). Suicide Death: Active Duty Officer Aggregated Logit Regression Results

Variable	Demographics Only	Demographics and Service-Specific Factors	Demographics, Service-Specific Factors and Mental Health Diagnoses
Service-Specific Factors			
Junior Officer (O1-O3) (ref group)	1	1	1
Mid-level Officer (O4-O5)		0.803	0.891
		(0.375)	(0.417)
Senior Officer (O6-O10)		0.866	1.020
		(0.556)	(0.654)
Warrant Officer (WO2-WO5)		1.038	1.245
		(0.782)	(0.935)
Administrative Designator (ref group)	1	1	1
Other Designator		0.460	0.441
		(0.308)	(0.294)
Surface Designator		0.489	0.455
		(0.313)	(0.288)
Submarine Designator		0.230*	0.228*
		(0.204)	(0.201)
Engineering Designator		0.402	0.393
		(0.439)	(0.428)
Aviation Designator		0.341*	0.358*
		(0.212)	(0.221)
Intelligence Designator		0.211	0.202
		(0.228)	(0.216)
Medical Designator		0.549	0.485
		(0.332)	(0.290)
Supply Designator		0.733	0.702
		(0.557)	(0.531)
Not Deployed to Combat Zone (ref group)	1	1	1
Deployed to Combat Zone		0.568	0.574
		(0.214)	(0.217)
Shore Facilities (ref group)	1	1	1
Small Platforms		0.691	0.695
		(0.399)	(0.403)
Large Platforms		1.112	1.130
		(0.452)	(0.464)
Unknown Platforms		0.945	0.948
		(0.377)	(0.384)
Constant	0.000508***	0.00138***	0.000892***
	(0.000316)	(0.00108)	(0.000717)
Observations	62,998	62,998	62,998

Variable coefficients are odds rations. Standard errors in parentheses.

*** Significant at the 99% level, ** Significant at the 95% level; * Significant at the 90% level.

Note:

1. White race/ethnicity category includes unknown race.

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V. CONCLUSIONS AND RECOMMENDATIONS

We have analyzed the role of service-specific and mental health risk factors in active duty and reserve component Navy enlisted and officer suicide attempts and deaths from 2002 to 2011. The following research questions were addressed through logit regression analysis:

1. What non-demographic, service-specific factors (for example, sailor rating, warfare platform, combat zone deployment, type of command, transition status), and pre-screening factors (such as AFQT, substance abuse, medical or legal waivers) are associated with the occurrence of suicide attempts and death by suicide?
2. How have suicide behavior trends (suicide attempts and death) differed between the active duty and reserve component Navy officer and enlisted populations?
3. In both the active duty and the reserve components, how do risk factors change between suicide attempts and death by suicide?

We find that diagnosed mental health conditions consistently increased the odds of Sailors, in all populations, attempting and/or dying by suicide. For active duty enlistees and officers, diagnosed depression increased the odds of attempting suicide by the greatest magnitude. Conversely, the leading mental health risk factor for reserve component enlisted was diagnosed substance use. When evaluating the outcome of death by suicide, active duty enlisted and officers continued to display consistent mental health risk factors, such that a previous suicide attempt greatly increased the likelihood of a sailor subsequently dying by suicide. In the dataset, less than 1% (0.25% enlisted, 0.39% officer) of those diagnosed with a suicide attempt subsequently die by suicide. It’s also important to note that not all suicide deaths would have an associated clinical record of suicide attempts. Additionally, diagnosed depression and substance use remain associated with increased odds of dying by suicide. Similar to enlisted reserve component suicide attempt results, substance use was the leading risk factor for dying by suicide, followed closely by depression. Contrary to the active duty, a previous suicide attempt was found to have a statistically insignificant effect for the enlisted reserve population. Across both active and reserve populations, PTSD was not a statistically significant risk factor for death by suicide.

Service-specific factors showed varying level of significance across the different populations; however some consistencies were seen between the active duty and reserve component enlisted for the outcome of attempting suicide. Demotion and paygrades E1-E4, and small (minesweeper, frigate, destroyer, cruiser) and large (amphibious, aircraft carrier) surface platforms were associated with increased odds of attempting suicide. Contrary to popular theory, deployment to a combat zone decreased the likelihood of an enlisted sailor attempting suicide. Furthermore, all categories of accession waivers were found to be insignificant. The only statistically significant service-specific characteristic for active duty Navy officers was designation as an intelligence officer, which increased the susceptibility of attempting suicide.

Increased variability in service-specific factors was seen when analyzing the outcome of suicide death. Consistent with attempting suicide, previous demotion increased the likelihood of dying by suicide for both active and reserve enlistees. As in the suicide attempt analysis, personnel in lower paygrades (E1-E4) continue to be at an increased risk for suicide death in the active enlisted population; however, this characteristic is not significant for enlisted reservists. Also consistent with the suicide attempt analysis, active duty enlisted deployed to a combat zone had lower odds of dying by suicide, whereas enlisted reservists had higher odds. Assignment to small and large surface platforms decreased a sailor's risk for dying by suicide, which was inconsistent with attempting suicide. Accession waivers, specifically other and major waivers, were found to increase the likelihood of suicide death in the enlisted reserve population. This variable is not statistically significant for any other population or outcome. Due to the rarity of suicide death and the size of the officer population, no service-specific factors were statistically significant.

The greatest limitation of this study is the composition of the reserve component data and the availability of reserve component medical information. The dataset does not differentiate individuals that have served only in the reserves or in both the active and reserve components. Reservists constantly transition between states of activated and non-active service, which effect suicide behavior risk and protective factors. To further explore suicide behavior risk factors in reserve personnel, we recommend that analysis be conducted on subsets of the population, specifically exploring the differences between activated and non-activated reservists and active duty only service members and reserve component (never activated) only service members. These analyses should shed light on the similarities and differences of suicide behavior risk factors between the active and reserve population.

Prior to 2011, suicide behavior data was only captured for reservists in active status. This represents roughly 10% of the total reserve population across the DOD (Garamone, 2014). As such, the Tricare data used in this analysis is incomplete for the reserve sample. The lack of a centralized military medical database to collect health information from civilian health care networks prevents access to accurate and complete reserve health data. Until the Navy is able to track all diagnoses that are made in the civilian sector for reserve personnel, the association between mental health diagnoses and suicidal behaviors will not be correctly identified.

Based on the finding we make the following recommendations.

(1) Align DON Suicide Prevention Programs with behavioral health initiatives based on current research findings. Mental health conditions were the leading risk factors for attempting suicide and death by suicide. Incorporating a comprehensive approach to suicide prevention will create a team of medical, administrative, and operational leaders that are able to identify and treat individuals at higher risks for suicidal behaviors.

(2) Conduct separate analysis for the method used to attempt and/or complete suicide. The method of attempt and death is included in the data used for this analysis; however we did not evaluate these details. Analyzing the methods used to perform suicidal acts could identify additional risk factors that exist. Additionally, these results could assist in identifying the highest risk populations and aid in the continued improvement of suicide prevention programs.

(3) Conduct additional research on demotion. Demotion was a consistent risk factor for suicidal behaviors; however the cause of demotion is unknown. Demotion can be the result of wide range of events from administrative, civilian/criminal, and work productivity. The root cause in these deficiencies could identify specific causes for demotion that are associated with suicidal behaviors. This information could then be used to target at risk sailors and tailor prevention programs to their needs.

(4) Conduct additional research on the environment and culture of surface combatants. Assignment to surface platforms was associated with an increased risk of attempting suicide and decreased risk for completing suicide. Exploring the differences and similarities between these platforms and their associated culture may identify particular features that change a Sailor's risk for each type of suicidal behavior.

LIST OF REFERENCES

Bryan, C. J., & Clemans, T. A. (2013) Repetitive traumatic brain injury, psychological symptoms and suicide Risk in a clinical sample of deployed military personnel. *JAMA Psychiatry*. *70*(7), 686–691.

Centers for Disease Control and Prevention. (2012). Facts at a glance. [Data sheet.] Retrieved from National Center for Injury Prevention and Control: www.cdc.gov/violenceprevention/pdf/Suicide-DataSheet-a.pdf

Centers for Disease Control and Prevention. (2013). Definitions: Self-directed Violence. Retrieved from National Center for Injury Prevention and Control: http://www.cdc.gov/ViolencePrevention/suicide/definitions.html

Centers for Disease Control and Prevention. (n.d.). National Death Index. Retrieved from http://www.cdc.gov/nchs/ndi.htm

Chavez, B.R. (2009). Informational brief to the DOD Suicide Prevention Task Force [PowerPoint slides]. Retrieved from http://www.health.mil/Reference-Center/Presentations/2009/10/01/Navy-DOD-Suicide-Task-Force-Brief.Exec. Order No. 12,744, 56 F.R. 2663 (1991).

Exec. Order No. 13,239, 66 F.R. 64907 (2001).

Exec. Order No. 13,119, 64 F.R. 18797 (1999).

Garamone, J. (2014, April 25). DOD releases suicide event report, changes reporting methods. Retrieved from: http://www.defense.gov/news/newsarticle.aspx?id=122126

Hilton, S. M., Service, D. B., Stander V. A., Werbel, A. D.,& Chavez, B. R. (2009). *Department of the Navy Suicide Incident Report (DONSIR): Summary of Findings, 1999–2007*. Report 09–15. San Diego, CA: Naval Health Research Center.

Jakupcak, M., Cook, J., Imel, Z., Fontana, A., Rosenheck, R., & McFall, M. (2009). Posttraumatic Stress Disorder as a risk factor for suicidal ideation in Iraq and Afghanistan war veterans. *Journal of Traumatic Stress*, 22(4), 303–306.

Lien, D. S., Kelley, L. J., Gregory D., Hiatt, C. M., & Reese, D. L. (2013a). *DON Military Career Characteristics Associated With Suicide.* Alexandria, VA: Center for Naval Analyses.

Lien, D. S., Kelley, L. J., Gregory D., Hiatt, C. M., & Reese, D. L. (2013b). *Risk factors associated with suicide: a review of the literature.* Alexandria, VA: Center for Naval Analyses.

Moore, B. A., & Barnett, J. E. (2013). *Military psychologists' desk reference*. New York, NY: Oxford University Press.

Navy Personnel Command. (2014, November 5). Statistics. Retrieved from Navy Personnel Command: http://www.public.navy.mil/bupers-npc/support/21st_Century_Sailor/suicide_prevention/Pages/Statistics.aspx

Navy and Marine Corps Public Health Center. (n. d.). Suicide at a glance. Retrieved from Navy and Marine Corps Public Health Center: http://www.med.navy.mil/sites/nmcphc/Documents/health-promotion-wellness/psychological-emotional-wellbeing/Suicide_Infographic.pdf

Ramchand, R., Acosta, J., Burns, R. M., Jaycox, L. H., & Pernin, C. G. (2011). *The war within: Preventing suicide in the U.S. Military.* Santa Monica, CA: RAND.

Schoenbaum, M., Kessler, R., Gilman, S., Colpe, L., Heeringa, S., Stein, M., & Cox, K. (2014). Predictors of suicide and accident death in the Army study to assess risk and resilience in servicemembers (Army STARRS). *Journal of the American Medical Association Psychiatry.* Retrieved from http://archpsyc.jamanetwork.com/article.aspx?articleid=1835337#Methods

Smolenski, D. J., Reger, M. A., Alexander, C. L., Skopp, N. A., Bush, N. E., Luxton, D. D., & Gahm, G. A. (2013). *DoDSER Department of Defense Suicide Event Report Calendar Year 2012 Annual Report*. National Center for Telehealth & Technology (T2) and Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury (DCoE).

Stander, V. A., Hilton, S. M., Kennedy, K. R., & Gaskin, T. (2004). *Department of the Navy Suicide Incident Report (DONSIR): Summary of Findings, 1999–2002*. Report 04–19. San Diego, CA: Naval Health Research Center.

Suicide Prevention Resource Center. (2011). *Understanding Risk and Protective Factors for Suicide: A Primer for Preventing Suicide*. Retrieved from: http://www.sprc.org/sites/sprc.org/files/library/RiskProtectiveFactorsPrimer.pdf

Task Force on the Prevention of Suicide by Members of the Armed Forces. (2010). *The Challenge and the Promise: Strengthening the Force, Preventing Suicide and Saving Lives*. Washington, DC: Department of Defense.

Task Force Resilient. (2013). *Final report.* Washington, DC: Office of the Chief of Naval Operations.

TRICARE. (n.d.). Welcome. Retrieved from http://www.tricare.mil/Welcome.aspx

Trofimovich, L., Skopp, N.A., Luxton, D.D., & Reger, M. A. (2012, February). Health care experiences prior to suicide and self-inflicted injury, active component, U.S. Armed Forces, 2001–2010. *Medical Surveillance Monthly Report*, 2–6.

Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S., Selby, E. A., & Joiner, T. E. (2010). The Interpersonal Theory of Suicide. *Psychological Review*, *117*(2), 575–600. doi:10.1037/a0018697

World Health Organization. (2014). *Preventing suicide: A global imperative*. Retrieved from http://www.who.int/mental_health/suicide-prevention/world_report_2014/en/

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